THE ENGINEERING AND MINING JOURNAL.

RICHARD P. ROTHWELL, C. E., M. E.
ROSSITER W. RAYMOND, Ph. D. } Editors.

NOTE.—Communications relative to the editorial management should be addressed to Mr. ROTHWELL. The articles written by Mr. Raymond will be signed with a star.

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AMERICAN INSTITUTE OF MINING ENGINEERS.

NOTICE TO MEMBERS AND ASSOCIATES.

A PART of the edition of the fourth volume of Transactions of the Institute will be bound in half leather and furnished to members at fifty cents for binding. The volume will be ready for distribution early in January, and members are therefore requested to give notice at once to the Secretary if they wish bound volumes; otherwise, uncut volumes in paper will be mailed as usual.

LAFAYETTE COLLEGE, EASTON, Pa. THOMAS M. DROWN, Secretary.

PERSONAL.—Mr. WM. G. NEILSON, late Secretary of the Institute's Headquarters, begs to announce that the Institute rooms in Girard Street having been closed, his address will hereafter be No. 3,703 Walnut Street, Philadelphia.

THE NEW YORK GAS COMBINATION.

EVERY one knows that there is very rarely competition among gas companies; however many there may be in a city, they simply all agree to charge the same exorbitant prices and divide the spoils. The latest exhibition of this manner of carrying on what the President of the Manhattan Gas-Light Company calls "a business of truth and conscience," is given in the prices asked for supplying the city with gas for the next year. In order to make the subject intelligible, we give herewith the prices charged the city for several years past and the rates now asked; also the number of lamps which each company lighted during the present year.

PRICE OF GAS PER STREET LAMP CHARGED THE CITY SINCE 1872.

Companies.	1873.	1874.	1875.	1876.	1877.	Lamps lighted in 1876.
New York.....	$39 00	$33 00	$28 00	$23 00	$36 00	4,142
Manhattan.....	39 00	33 00	28 00	23 00	36 00	4,116
Metropolitan.....	39 00	33 00	38 00	34 12½	32 00	3,719
Harlem.....	39 00	39 00	38 95	37 95	37 50	4,061
New York Mutual.....	—	35 00	29 16⅔	25 75	36 00	3.535
Gas coal per ton (2,240 lb.) at New York.....	—	7 40@ 7 50	6 25@ 6 50	5 25@ 6 00	—	

Each lamp should burn 3,833 hours per year, or, at 3 feet per hour, 11,500 feet. Gas should be of 16-candle power.

We have also annexed the prices per ton of 2240 lb. (delivered in New York) paid for gas coal during the past three years. It will be observed that during the present year this price was from 50 cents to $1 per ton less than in 1875, and from $1.50 to $2.20 less than in 1874. Wages and the other items of cost in the manufacture of gas have also declined at least as rapidly as coal, so that the actual cost of gas, which is now probably 70 to 80 cents per thousand feet, is less than in previous years. There is no prospect whatever of higher prices for coal ruling during 1877 than those that have been quoted for the present year; indeed the indications are rather towards lower prices.

This grasping monopoly is courting its own destruction. There is some prospect of its extortionate claims resulting in a decided benefit to the public, for we understand there is a movement on foot by responsible parties to offer to supply the city with gas made by the Lowe process at even less than two dollars per thousand feet. The city, we believe, can make arrangements of an exceedingly desirable nature with these parties, and secure for the public a supply of a very superior gas at prices far lower than have ever ruled here. There is, in fact, no reason why gas should cost two and a half or three times as much here as in London, when coal, labor, and most of the other items entering into its cost are but little (and in some cases not at all) higher here than there. In London the maximum price the companies are allowed to charge is 3s. 9d. per thousand, but there they are not allowed to earn *forty per cent.* dividends on heavily watered stock; and, if we interpret public opinion correctly, they will not be allowed to do so much longer here. Gas is almost as much a necessity as water in large cities, and the public should be supplied with it at reasonable prices, and should be effectually protected against the extortion which demands *forty per cent. dividends*, while practising expensive and wasteful methods of manufacture.

This important subject will receive further consideration by us next week.

REPORT OF THE COMPTROLLER OF THE CURRENCY.

THE report of Mr. KNOX, always one of the most important and interesting documents accompanying the President's message, possesses these qualities this year in an unusual degree; since the Comptroller takes occasion, *apropos* of the Centennial, to present in concise and convenient form a history of banking in this country, from the organization of the Bank of North America, in 1782, through the periods of the two Banks of the United States and the different systems of State banking, down to the creation of the present national system. This simple narrative constitutes one of the strongest arguments that could be framed in favor of the national banks, and will impress every candid reader with the conviction that they ought to be maintained, unless something clearly better can be suggested. That all previous systems were worse, can scarcely be disputed. Mr. KNOX says that, in his judgment, the true policy of the Government, and the one which will ultimately be adopted, is the funding of the Treasury notes and the reduction of the rate of interest upon its present indebtedness. In this event, he continues, the circulating medium of the country will consist, not of specie and Treasury notes, but of specie and national bank notes; or else, through the repeal of the law imposing a tax of ten per cent. upon other issues, the system of State bank issues will be revived. It is certainly to be hoped that for the present, at least, the latter will not be permitted. Some States would undoubtedly establish safe and wise regulations, or maintain such already established. Others, as history has shown, would become the scenes of speculation and corruption in banking; and at the very best, we should have the evils of variable and conflicting legislation in the several States, and the nuisance of uncurrent, worthless or counterfeit bills in abundance.

With regard to the important question of specie resumption, Mr. KNOX's estimate of the amount of coin and bullion in the country June 30, 1876, is timely and valuable. It is practically that of the Director of the Mint, being based on his figures, according to which the probable amount of gold coin and bullion is $151,565,000, and of silver coin and bullion, $30,113,000. We commend these facts to the financiers who advocate a coinage system which would inevitably drive away gold coin and leave us to "resume" on silver.

Mr. KNOX, as the chief author of the Coinage act of 1873, has naturally felt aggrieved by the wanton accusation of the "silver party" in Congress, that the practical demonetization of silver by that act was a trick, the true object of which was neither announced, discussed nor understood by Congress. We took occasion, long ago, in criticising the speech of Senator JONES, to prove with facts and dates the unwarrantable character of this assertion. Mr. KNOX fully establishes the same point in the report before us, fortifying his statement with an extract from the forcible address in the House of Mr. HEWITT, which leaves no room to doubt that the discontinuance of the silver dollar by the Act of 1873 was repeatedly pointed out, and clearly understood. It was three times stated in the report of Mr. Knox, transmitted to Congress in 1870, as a commentary on the proposed act; it was mentioned with approval by numerous experts, whose opinions were likewise transmitted to Congress and printed; it was the subject of remark in the House debates. The bill containing it was printed thirteen times by order of Congress and once by the Commissioners revising the statutes, and was considered during five successive sessions. If the action of Congress after all these preliminaries was hasty and ignorant, pray what would be deliberate and well considered? Certainly not the attempt of that party in Congress which advanced this astounding charge, and thereupon attempted to revolutionize under the "previous question" the monetary system of the country!

The truth is, the silver standard had been practically abandoned for 40 years in the United States when it was formally abandoned by the Act of 1873. Nobody thought of restoring a double standard then. Hence the measure which a certain party now denounces passed without serious opposition. It was a wise step, and we do not believe it will be retraced.

We commend the Comptroller's report to all who desire, in view of approaching discussions of important questions of currency and banking, to possess compact and accurate statistics on these subjects. This document, with its predecessors, and the annual reports of the Director of the Mint (the latest of which was noticed in these pages last week) are magazines of ammunition which, no doubt, both parties will use freely, though we must confess that, to our mind, the shot and shell are capable of shooting one way only—namely, in favor of specie resumption and the gold standard. *

THE TREASURY CLASSIFICATION OF STEEL.

THE Treasury Department, it appears, has not been able to resist the infection of scientific debate on "What is Steel?" Hearing the echoes of the battle among the *savans*, it has resolved to take a hand. Unfortunately, there is a great difference between the harmless, though lively, discussions of learned bodies, and the ponderous performances of a government, wielding a real law, and hitting right and left, like a giant in earnest.

The Department, reversing an earlier decision, declares (July, 1876,) that the

product of the Martin process may be either iron or steel, and is subject to the lower or the higher duty, according to the decision of the customs officer, based upon tests, to be applied in each individual case. This decision has naturally excited both astonishment and alarm among American steel manufacturers, and an effort will be made to procure its reversal. If that fails, we presume that Congress will be appealed to; and we do not doubt that speedy relief will be provided. In this connection, the following opinions will be read with interest:

NEW YORK, December 5, 1876.

HON. ABRAM S. HEWITT: DEAR SIR—Having read the decision of the Treasury Department (July 14, 1876,) concerning the classification of metal made by the Martin or open-hearth process, I herewith submit, as you request, my reasons why this metal should continue to be, as it always has been, technically and commercially subjected to the same classification as that which obtains in respect of the product of the Bessemer and of the crucible processes.

I. All these processes involve the casting of the product in a state of fusion, into a malleable mass. They are hence often called, and will be referred to in this letter, as "fusion" processes.

II. Within the last dozen years, soft or slightly carburized products have begun to be made by the same fusion processes and in the same vessels which also produce hard or highly carburized products. As the harder products were universally known as "steel," the same name naturally adhered to the softer, and then to the softest, products. By whichever of the fusion processes—the crucible, the Bessemer or the Martin—they are produced, the softest as well as the hardest products are almost without exception bought and sold as "steel"; they are called "steel" by the workmen in all departments of the manufacture, and the works in which they are produced are named "steel works."

The International Committee appointed in June, 1876, by the American Institute of Mining Engineers, on the Nomenclature of Iron and Steel, and consisting of Messrs. I. LOWTHIAN BELL, of England, PETER VON TUNNER, of Austria, HERMANN WEDDING, of Germany, L. GRUNER, of France, RICHARD AKERMAN, of Sweden, THOMAS EGLESTON and ALEX. L. HOLLEY, of the United States—this committee, in the preamble of its report, states that these soft products, as made by the Bessemer, Martin and crucible processes, are commercially and professionally designated in England and in the United States as "steel."

III. But however general the use of the term "steel" may be for these soft products, it has been felt by every one concerned in the manufacture, the sale, the use and the literature of these products, that the nomenclature which came into use when only the hard products were made, should be enlarged, if possible, so as to do two things:—1st, so as to continue, as at present, to distinguish both the hard and the soft products made by "steel" or fusion processes from wrought iron made by puddling or by other than fusion processes; 2d, to distinguish between the hard and the soft products.

Many attempts have been made by individual manufacturers and by scientific men to establish a modified nomenclature; and within the past few years a large amount of discussion has taken place in technical societies and journals, not so much to determine what the term "steel" now covers, as to determine how the nomenclature can be best modified so as to clearly distinguish the soft products which have been made homogeneous by fusion from soft products which have a different structural character, on account of their having been produced by puddling, or by processes other than fusion.

None of the changes recommended can be said to have been adopted; but, as stated by the International Committee above mentioned, the old term "steel" is still applied to both the soft and the hard products of the fusion processes.

IV. One important point, however, which bears upon the question to be considered by the Treasury Department, is established by the Report of the International Committee, viz.:—the only Board of recognized experts which has ever been appointed to consider the matter, has, in reviewing the nomenclature as it now stands, unanimously testified that "homogeneity due to fusion is usually recognized as the most definitive characteristic of both hard and soft steels." Now, the product of the Martin process, however soft, is homogeneous in consequence of fusion, and is therefore "steel."

V. It has appeared necessary to say this much about the causes and history of the discussion on iron and steel nomenclature, not for the purpose of making this discussion an element in the question under the consideration of the Treasury Department, but rather for the purpose of showing that this question is not limited by the existing, nor by the discussed, nomenclatures, and that it may be answered in a more direct and satisfactory manner.

VI. What the Treasury Department desires to do, is to levy the same duty on products which are in their qualities and uses substantially alike. Now, it has been shown that the Martin, the Bessemer, and the crucible products are substantially alike, because they are all made homogeneous by fusion. But the Martin and Bessemer products are more strikingly alike in other respects.

1st. The Martin and Bessemer products are both to a certain extent pneumatic, that is to say, both are directly derived from crude cast-iron in certain proportions, from which the impurities are partly but not wholly oxidized and removed by atmospheric air.

2d. Both processes make both very hard and very soft products, and all intermediate grades. Both produce "steels" which are employed on a large and commercially successful scale for the manufacture of razors, miscellaneous cutting tools, springs and other articles which will harden when quenched in water while at a red heat. Both also produce "steels" in which the carbon is lower than it is in many forms of "wrought" or puddled iron, and which are therefore largely used for boiler plates and for many other purposes, the criterion of fitness being that they shall *not* harden when quenched in water while at a red heat.

3d. Products of the Bessemer process cannot be distinguished either by chemical analysis or by mechanical tests from products of the same grade which are made by the Martin or by the crucible process. In other words, there is no test known in the arts which can positively determine by which of the three processes mentioned a given piece of "steel" was made, if it is within the usual grades of structural steel.

4th. It is true that the Bessemer and Martin processes differ in several respects, most largely in the time and in the apparatus employed; but the question is not intrinsically one of processes, but of *products*. While the purification of the crude materials is somewhat greater in the Martin than in the Bessemer process, the same chemical reactions occur, and the same materials produce the same general class of products by both processes. Precisely the same amounts of the same materials are sometimes successfully employed in both processes. Some Bessemer steel is better than some Martin steel of the same grade, and *vice versa*.

For a large number of purposes, the products of both processes are used indiscriminately. For instance, both products are made and sold in this country for railway axles, for fire-arms, for miscellaneous merchant and machinery bars, and for rails. On the London and Northwestern Railway in England, most of the locomotive boiler plates employed are Bessemer, a smaller number are Martin, and a still smaller number are crucible plates. In the French Government shipyards, both Bessemer and Martin products are used for similar parts of ships and machinery. In the French steel works, boiler-plates, rails and general machinery and structural steels are made by both processes and in many cases at the same cost. In Great Britain, rails and railways tyres and axles are largely produced by both processes, generally at the same cost. In some localities the Martin product is cheaper than the Bessemer product: in other localities the reverse is the case.

In conclusion:—The evidence is thus abundant and universal, that the products of the Bessemer and the Martin processes are, to a great extent, interchangeable, regarding both quality and cost; that they cannot be distinguished by practicable tests, either from each other, or from crucible steel of the lower grades, and that they should therefore be subject to the same customs duties. The simple names of the Bessemer and Martin processes would for this purpose be a sufficiently definite classification. Yours truly, A. L. HOLLEY.

Mr. HOLLEY's reference to the identity of the chemical reactions in the Martin and Bessemer processes may perhaps be misunderstood. Both processes decarbonize cast-iron, and the union of the carbon of the cast-iron with oxygen is the chemical reaction involved. The source of the oxygen is, in the Bessemer converter, atmospheric air exclusively. In the open-hearth it is partly atmospheric air (while an oxidizing flame is acting), and partly iron oxide. But this explanation does not affect his argument.

NEW YORK, December 7, 1876.

HON. ABRAM S. HEWITT:

DEAR SIR—According to your request, I have examined the rulings of the Treasury Department, and particularly its decision of July 14, 1876, with reference to Martin steel. That decision declares that the Martin process produces sometimes iron and sometimes steel, and leaves to the customs officers, in each case, to determine "by such tests as are recognized by experts and practical workers of metals," whether the article imported as a product of the Martin process is iron or steel.

The declaration above quoted raises a question of fact. This question cannot be settled by appealing to any recognized *definition* of iron and steel. For a dozen years there has been no such definition, and experts are still busy attempting to formulate one in accordance with the general, uniform and unconquerable usage of technical literature, practice and trade. It is to that usage that we must look for guidance.

Both general and technical literature speak of all grades of Bessemer and Martin metal as "steel." The low or soft steels which "harden" but slightly are common to both processes.

The usage of experts and of trade is unanimous to the same effect. The term "Martin iron" is never heard; the term "Bessemer iron" means only the pig iron which is to be used to make Bessemer steel.

The usage of the Treasury Department itself is conclusive. I do not refer to its former ruling (now reversed) concerning Martin steel, nor to its classification of all Bessemer metal as steel, in obedience to a specific proviso in the law; but to its recognition of all crucible cast steel as "steel," without any specific proviso to that effect in the law. Here we have, apart from all theoretical considerations, an ancient, uniform and clear precedent. If the Martin metal, grade for grade, is like the crucible metal, then it is, according to this precedent, not sometimes "iron" and sometimes "steel," but always "steel."

This is precisely the fact. Soft steels—for instance, boiler-plate steels—may be, and actually are, manufactured by the crucible process. They cannot be distinguished by any test whatever from the Martin metal of the same grade, used for the same purpose. Since the open-hearth is itself but a large crucible, and the metal is completely fused in both cases, there is no reason to expect a recognizable difference in the products. It was the impracticability of distinguishing the products of the crucible, the Bessemer converter and the open-hearth, which imperatively required and has hitherto maintained the recognition of all these metals as steel; and no new classification can now be devised, whether based on chemical or on physical tests, which will not divide the crucible steels as certainly as the Bessemer or Martin steels.

The fact, as thus deduced from threefold usage, accords perfectly with equity, policy, and the intent of the law. The soft Martin steels are made by the same process as the harder varieties; but they are made at greater cost, and command a higher price. To classify them as iron, at a lower duty, is contrary to the principles of revenue and protective tariff legislation alike.

To call soft Martin steel "iron," while exactly the same metal produced by other methods is classed and taxed as steel, would simply lead to the importation as "Martin iron" of Bessemer and crucible steel, and thus to a further loss of revenue and defeat of protection.

Since there are no "recognized tests" now existing by which homogeneous, cast, malleable metal can be positively determined to be iron and not steel, the adjudication of such a question by revenue officers would be uncertain and variable, different officers having different standards.

Finally, while differences of opinion as to theoretical definition do exist among experts, it may be said without hesitation that all parties agree as to what is the actual and uniform commercial usage; and all parties agree that this usage should be the basis of revenue legislation and administration.

If the foregoing considerations, and such others as may be suggested, are not sufficient to induce the Department to return to its former (and, in my judgment, more consistent and reasonable) construction of the law, Congress should at once give the relief which the case requires, by prescribing that the products of the Martin process shall be rated, like the similar products of the Bessemer process, as steel. Yours truly, R. W. RAYMOND.

FLOODING OF THE PENNSYLVANIA COAL CO'S. SLOPE NO. 2, AT PITTSTON, PA.—On Saturday last a shot fired by one of the miners in Slope No. 2 of the Pennsylvania Coal Company's Mines at Pittston penetrated an old opening driven to a depth of eight hundred feet some time ago, and the shock had scarcely subsided before it was followed by a rush of water that came leaping like a torrent from the aperture, driving the men precipitately from that portion of the works, and compelling them to cease operations ever since. The pump in connection with the slope, although it discharges a powerful stream through a fifteen-inch pipe, has so far proved unavailing to keep down the water, and at present the entire mine is deluged. The water is rising rapidly, and already has almost submerged the pumps and mining machinery at the foot of the slope, and little hopes of success are entertained. Thus far the source of the mysterious flood has not been ascertained.

ON THE CONSTANCY OF MOTION AND POTENTIAL ENERGY.

By Prof. Henry Wurtz.

THE article referred to in the following communication is entitled "The Constancy of Motion," by GEORGE ILES, and appeared in the December issue of the *Popular Science Monthly*, page 225. We give a few extracts confined altogether to the points referred to by Professor WURTZ. Mr. ILES's interesting discussion of the subject of gravitation, and his mode of reconciling this kind of energy to his theory, which takes up a large part of his paper, is therefore omitted altogether.

[*Communication.*]

TO THE EDITOR: SIR—As a result of our recent conversation, I transmit to you—with his cordial assent, since obtained—a letter written to Professor JOSEPH HENRY, my former preceptor, which is, in some measure, to be regarded (as now presented) as a reclamation on my part of some of the propositions of Mr. GEORGE ILES, which formed the subject of that conversation.

Your journal—as the exponent of the Society before which I had the honor, under the roof of the Smithsonian Institution, in February, 1876, first to make public these views*—is plainly a perfectly appropriate medium for such a reclamation.

I would take the opportunity to state, that all the spare time and energy that other work leaves me, has been, and is, occupied in forwarding the extensive computations necessary to substantiate the generalizations and laws brought forward on the occasion referred to last February; and that a Second Memoir, not merely introductory, like the former, but of a nature to admit of and invite legitimate discussion, will soon be presented. Nothing will be more acceptable to me than such discussion, proceeding from sources not altogether wanting in knowledge of the subject, and of the ordinary amenities of fair and courteous criticism.

Respectfully, HENRY WURTZ.

LETTER TO PROFESSOR JOSEPH HENRY, WASHINGTON.

HOBOKEN, November 23, 1876.

PROFESSOR JOSEPH HENRY: Dear Sir—You will no doubt have observed in the *Popular Scientific Monthly* for December, an article by GEORGE ILES (who is an entire stranger to me) entitled "The Constancy of Motion," in which some ingenious views are taken regarding the nature of "potential" energy. In a nutshell, as I understand him, regarding energy of elastic tension, as of a bent spring, he finds its origin in a gyratory motion of the atoms in orbits, polarized in certain planes, using the phenomena of the gyroscope as illustrative; claiming, therefore, that the energy is that of *actual* motion. His attempt at a speculation regarding *gravitation* I do not find so clear.

Mr. ILES goes on further to argue that the latent heat of fusion of ice, and the heat of chemical action, are due to conversion and reconversion of atomic (he calls it here *molecular*) motion into actual energy of temperature, and the converse. His notions of atoms and molecules seem confused, as appears from his speaking of "free hydrogen, oxygen or carbon" as composed of "atoms," apparently ignoring the existence of *elemental* molecules, made up of systems of atoms, such as you and other physicists maintain, and which chemical facts force us to admit. (Thus, even *gaseous* elemental allotropes, and polymeres, are well recognized.)

Though I would not hold that Mr. ILES may not have arrived at his ideas independently, yet it is, of course, legitimate for me to point out—as a mere matter of priority of discovery—that these new views of the nature of potential elastic energy and potential chemical energy, as due to atomic motion, are obvious, and but very small, expansions of the train of thoughts I have presented in my Preliminary Memoir on Geometrical Chemistry. On pp. 58-9 (pamphlet edition) occur the following passages:

"From 3, it will follow that the rise of temperature developed by *hammering a metal*, or *crushing a rock*, thus forcibly changing its volume, or that of some of its constituent molecules (and under this I would also include the *heat of friction*), is due partly at least—it may be almost wholly—to such changes of volume; such heat being of *internal* origin, or a conversion of *intra-molecular* or *atomic potential energy* into *energy* of *temperature*.

"This latter form of energy, called popularly *Heat*, I am forced to regard as dynamic energy (or motion) of the *molecule*, as distinguished from latent (or potential) internal atomic energy. This *internal atomic* energy—which I wish here to define merely in a preliminary way—I would submit to be the cause of the occupation of the *space of the molecule itself*, (the *inter-molecular* distances being due to molecular energy, or *temperature*, and, therefore, *possibly equal in all bodies at the standard temperature of ice-fusion*). My molecular diameters become, then, the measures of *intramolecular*, atomic, or chemical energies, and will be our guides to the laws that govern these."

I submit that there is here a complete anticipation of Mr. ILES, as regards *chemical* potential or latent energy, including the potential energies of changes of state and of chemical transformations generally; and I submit, moreover, that I have here gone much further than he, and given a clearer and completer generalization of the phenomena, by not only defining *all* atomic motion or energy as potential, but also all energy of *temperature* (which is transferable, and to that extent *molar*) as motion or energy of the chemical molecule, as a whole, independent of its constituent atoms. Mr. ILES's proposition is merely the reverse of this—which, as regards *chemical* phenomena, is obvious—he maintaining that all potential energy is atomic (or, rather, as he indistinctly states it, either atomic or molecular).

His illustration from the gyroscope is certainly new, and excellent, but with regard to his suggestion that "the particles of a spring may have a definite plane of molecular motion," I would beg your attention to the following from page 61 of my pamphlet:

"Changes from *solidity* to *liquidity* and the converse, which involve but small volumic change, are nevertheless generally both molecular and atomic—molecular usually in a *quantitative* sense, as involving temperature of the external medium, and atomic chiefly in a *qualitative* or *directional* sense, involving and implying, in solids, the polarization of the highly elliptical atomic orbits into certain planes, related, in ways hereafter to be sought out, to the crystalline axes or structure."

Mr. ILES's suggestion is here clearly anticipated, and as an inevitable *generalization* from chemical facts. The general idea of *polarization* as a cause of solidity, I derived, of course, from your own teachings; but consideration of *chemical* phenomena, and especially of this matter of inherent latent, and of mobile "kinetic," energies, has led me to conclude that the polarization must be that of direction of *atomic motion*, instead of that of atomic position only.

I would propose to consider motion of matter, or *energy*, as of three degrees:

1. Molar motion.
2. Mobile, molecular (or intermolecular) energy (including temperature, electrical and magnetic action).
3. *Intramolecular*, atomic, or chemical motion, which might also be called *inherent* energy, changes of which are accompanied by changes of molecular volume and of chemical identity.

The third kind of energy (intramolecular, or that of the atoms inside the molecule) is always *potential energy*; but during chemical changes—involving always changes of molecular volume—it becomes first mobile or intermolecular, and then (in producing expansion of molar volume) necessarily molar.

Probably, to bring these theoretical views of the energies of matter somewhat nearer completeness, it would be desirable to indicate further certain special *chemical* considerations which bear essentially on the division of phenomena (or rather of *energies* the causes of phenomena) into these two salient groups—mobile and inherent, or intermolecular and intramolecular, potential energies. This is a branch of the subject which, in my Preliminary Memoir already referred to, I have expressly reserved (the volumic facts being incompletely generalized), but which may now interest you to touch upon slightly. I have found it easy to determine, as an induction from all the facts, that *solid elastic* energy must belong to the third degree, or that of inherent, intramolecular or *chemical* energy; and that it is not a resultant of mere motion of the molecules, or of arrangements of the molecules into *crystalline* structures; the latter kind of rigidity or solidity being certainly only one mode of the molecular affection which produces solidity, whatever that affection may be. Thus, many of the most perfectly elastic homogeneous solids are among those which never have shown us any evidence of crystalline structure; for example: *cellulose*, as wood, vegetable ivory, etc.; *gelatine* and *osseme*, as whalebone, animal ivory, etc.; *albumenoid* substances; and generally the "colloid" class of GRAHAM, which cannot be regarded as merely cryptomeric or crypto-crystalline. I think you will readily see, on considering these instances, the ground of my view that elastic rigidity is a resultant of chemical or atomic constitution, motion or energy, and not always merely of molecular or intermolecular arrangement into crystalline systems.

The grand principle brought forward first in my Preliminary Memoir, which I believe will be readily accepted as a fundamental doctrine in science, is, that *occupation of space by matter is a chemical phenomenon*, and can only be studied with success as a part of the universal science of chemistry. This will become clearer, it may be, when I suggest the consideration that *density*, of a homogeneous mass, is a *chemical* character, changing and persisting with the chemical molecular nature or identity. And material volume is but the reciprocal of density. The only *inherent* chemical characters considered hitherto have been the *equivalent weights*. If these are the weights of the atoms, according to the Daltonian theory, this part of my own theory becomes a new postulate of the latter, to the effect that *equivalent volumes measure directly the motions or energies of the atoms*. By this new conception, the chemical elemental atoms, hitherto mere dead *weights*, become *vires vivæ*, or living forces, which fill up the Universe; and the study of the laws and changes of their motions or energies (that is, of changes of molecular volumes) will open new vistas into unknown realms of nature, beyond any possible present prevision.

Respectfully, HENRY WURTZ.

Extracts from a paper on THE CONSTANCY OF MOTION, by GEORGE ILES, in *Popular Science Monthly*, for December, 1876.

Let us examine some cases of "potential" energy, and see if they be not actual, although under a disguise; so that the present definition of the conservation of energy may be replaced by the more intelligible statement that motion is constant; that it is never abolished for a time, nor absolutely suspended, all appearances to the contrary notwithstanding, and that so, all cases of energy are dynamic, and no part of them static, as now currently held.

Matter seemingly at rest may contain within itself motions as real as those to which at another time it openly gives rise, when it radiates heat or attracts by magnetism. * * *

Attraction, then, wherever it appears, I believe to be due to contained motion in the particles of the bodies presenting it; which molecular motion is the equivalent of, and convertible into, the movement of masses as wholes.

Gravity, I venture to hold, is a force due to a distinct motion of the ultimate parts of matter, which has not yet been formulated. * * *

The case of a spring may be intelligibly explained on the same principle of the constancy of motion. The particles of a spring may be assumed to have a definite plane of molecular motion, which motion we shall presume is that due to temperature. In coiling, these planes are changed, and energy is required to do it; just as when a gyroscopetop is rapidly revolving in a certain fixed plane, it may, by a measurable effort, be made to revolve in a conical curve, with one end of its axis stationary, and the other describing a circle in space. And, as the gyroscope strongly tends to move in a uniform plane, and can do work in resuming such a plane, so I assume that the particles in a coiled spring have two similar motions, one of which is at any time available for tangible work when the spring is freed. * * *

An extension of the hypothesis that motion is continuous would lead to the inference that the so-called latent heat of water at 32° Fahr., as compared with ice at the same temperature, is due to the swifter movement of the molecules in the former case; and no facts are better known than that mechanical motion can become heat, and that heat turns ice into water.

Another implication of this theory is that atoms, as free hydrogen, oxygen, or carbon, are in exceedingly greater commotion than molecules, such as those of water or carbonic-acid gas. For the decomposition of such molecules may be effected by the exhaustion of mechanical motion, and I take it that the dynamic state of the products must balance this expenditure. What else can become of it? *

The analogy between chemical units and small magnets is very close: as a magnet decreases in size, so, relatively thereto, does its attractive power increase; and, were we able to go on dividing until we came to a single atom of iron, we should doubtless have the magnetism merge into the equivalent phase of intense chemical affinity.

Without further illustration, then, of the principle set forth, I will say that as in recent years we have had to familiarize ourselves with the idea that many forms of actual energy are impalpable, as the rays of light and the waves of sound, so now I think there are good grounds for extending our ideas so as to believe that all phases of "potential" energy are really actual; that as we cannot but think that only motion can breed motion, energy means motion; and that as such its amount is constant, and its presence, behind whatever veil, continuous; so that it is only properly divisible into two kinds, perceptible and imperceptible.

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*See this Journal of June 3, 1876, page 540; also the *American Chemist* for March, 1876, where the full text will be found of the "Introductory Memoir" of Professor WURTZ, on "Geometrical Chemisty." An admirable digest has recently appeared, by ALFRED GOEBEL, a chemist of Ghent, in the *Moniteur Industriel Belge*.

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CONVERSAZIONE OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

Abstract of Remarks of Mr. Holley, at 1100 Girard Street, Philadelphia, Nov. 10.

THE closing of the Centennial Exhibition to-day must be a matter of regret to Philadelphians, because it terminates the remarkable period of their generous hospitality to innumerable guests, native and foreign.

A short review of the exhibits in iron and steel, one of the specialties of the Institute, may be of interest. The exhibition in this direction has been, on the whole, very large and very good, although showing few elaborate and difficult rolled or forged masses, but enough to prove the state of the art. The finest exhibit is from Sweden, especially when we consider the remoteness and smallness of that country, and the fact that she is not rich and can hardly expect to increase her market here. We may note, in passing, that her contributions in art manufactures and in everything—bearing in mind the above facts—make her exhibit perhaps the most creditable at the Centennial. Iron and steel exhibits are notable for their consecutiveness and their completeness. Every question is answered, from the raw material to the finished product, by the display itself. The analyses, the fractures of ingots and bars of regularly increasing carburization, the Kirkaldy tests in series, and the unmistakable *cold* twisting and bending of bars and tuyéres, are complete groups of quality, and an example to future visitors.

The exhibits of Russia, taken in connection with her art exhibits, show her to be abreast with all Europe, rather than as we had supposed her, a fellow-barbarian with us. Her iron and steel forgings, plates, cables, &c., show good machinery and skill, not only in the fabrication of ordinary forms, but in large and difficult forging and rolling.

The German exhibits are few, but they are fine and characteristic. They are, however, more of a show of elaborate than of ordinary forms. The Krupp guns are works of high engineering art, and the Haswell pressed forgings are very remarkable, as illustrating the great adaptation of modern soft steel to a vast variety of shapes, which are producible by pressing, and which are substitutes for both forgings and castings. These pressed forgings show as much useful progress as anything in the Exhibition.

France and Belgium are unrepresented by their two great works at Le Creusot and Seraing, and their exhibits are not characteristic, though the former shows some beautifully stamped wheels from Rive de Gier, about which we had a paper at the June meeting from Mr. HENRY, and the latter some fine forgings by Mabille, in the remarkable Chaudron shaft-sinking machine, and some good iron from indifferent ores, and some good sheet rolling.

Great Britain makes the least characteristic show of any nation, yet most of what there is, although small in extent, is remarkable. The little Admiralty exhibit of Siemen's furnace products is to the expert about as satisfactory as anything at the Centennial. There is not much finish about the Siemen's, but the manner of their distortion *proves* quality. The armor plates of BROWN & CAMMELL, and the wire of several exhibitors, are specially noticeable.

The exhibits of the United States are very extensive, and are generally arranged in a costly and usually in an artistic manner. They are for this reason attractive to the public, although with a few exceptions they lack two elements of interest to the expert: 1st, they are chiefly a reproduction of the commoner rolled forms, without elaborate forging or rolling, or any stamped work; 2d, they lack, to a considerable extent, proof of quality. The remarkable exceptions are the Sligo and the Wayne exhibits from Pittsburgh, while COOPER, HEWITT & Co., the Ohio Iron and Steel Co., the Albany and Rensselaer Co., PARK BROS. & Co., and some others prove quality pretty well. But there are many tons of bars, nicely enough rolled, and some of them beautifully rolled, no fractures or bends, or analyses or tests of which are exposed. On the whole, the quality of the rolling of common forms, and the character of machinery for rolling such forms, as proved, for instance, by the Edgar Thomson 120-feet steel rail, seems superior to those abroad. But we ought to have been taught that we must make *press forgings* and all large and elaborate forms for heavy machinery, just as works abroad are making them, plentifully and cheaply. As far as quality is proved, this country seems to stand as high as any in which the same character of raw materials is employed.

A few words about the awards. The Centennial Commission came very near doing a perfectly wise thing. The experts' report, stating *why* and in what degree an exhibit is worthy, is the only possible way to treat a miscellaneous collection fairly. But to reduce everything to a dead level again, by uniform medals, is as bad as possible. The recipient will parade the medal, and thus make the average public believe his wares are as good as anybody's, however much the report accompanying the medal (which he won't parade) may damn him with faint praise. The English language, carefully used by an expert, is a rather better means of expressing delicate shades of difference between exhibits than any possible gradation of medals. No competitive exhibits can be "first best," "second best," etc.; some are first best in a certain function or quality, others are first in another function or quality. A perfect system of awards, it should seem, would be simply a system of carefully written reports by experts, setting forth the respective merits of the various objects, and where there were demerits, letting them appear by implication or by silence, rather than by notice. By quoting what was said of his exhibits, and calling attention to the fact that the same was not said of other exhibits, the maker or inventor of a good feature could set it vastly more fairly and influentially before the public than he could by any barbaric system of medals; for the public are wisely beginning to distrust symbols, and to prefer downright reasons in plain language.

BLOWING AND VENTILATING MACHINES AT THE PHILADELPHIA EXHIBITION.

Special Correspondence of the Engineering and Mining Journal.

THE WARING COMPRESSOR.

ALLISON & BANNON, of Port Carbon, Pa., build these engines, which belong to the horizontal, direct-acting, duplex type. The steam cylinders are 12×42 inches, and are placed between the fly-wheel shaft and the air cylinders, the dimensions of the latter being 15×42 inches. The air-compressing cylinders are double acting, the inlet valves being placed in the ends of the cylinders. The cylinders are kept cool by the circulation of water through spiral passages in a casing which surrounds them. No special arrangement serves to cool the moving pistons.

On a card containing a short description of the engine, the statement is made that the engine "will compress air up to same pressure as steam used," which seems rather extraordinary when the diameters of the air and steam cylinders are considered.

THE DOUGHERTY BLOWER.

A blower made after this patent is shown in the exhibit of FERRIS & MILES, at B. 32, Machinery Hall. This pressure blower differs from those which have already been described in several important particulars. In construction the machine consists essentially of a cast-iron cylindrical casing truly bored out, in which revolves a cylindrical drum of smaller diameter, and which is set eccentrically with regard to the casing, the exterior surface of the drum being nearly tangent to the interior of the casing. The drum is made in three sections, which, when rolled together, leave three slot-like openings across the cylindrical surface of the drum. Through these slots pass three wrought-iron blades, or fans, rectangular in shape, which serve as air propellors. These blades work closely in the slots, against which they are kept from binding by two rollers, which bear against opposite sides of each blade within the drum.

The ends of the cylindrical casing, instead of being closed, are made of cast-iron open work, on the centers of which are cast quite large cylindrical bearings, which project inward. On these bearings turn freely two cast-iron discs, which fit closely to the cylindrical surface of the casing, and which really form the ends of the casing.

Circumferential grooves are cut in the inner faces of these discs, which serve to keep the blades in the drums out against the inside of the casing, as will presently be explained. Pins are screwed into the ends of each blade near their outer corners. These pins fit in brass shoes about eight inches long, which slide in the grooves cut in the circular discs. By this means the blades are kept nearly in contact with the casing, and are compelled to revolve in arcs concentric with the same casing. The drum, in its revolution, consequently slides over these blades as it approaches to, or recedes from, the casing. The considerable friction which the drum with its rollers exerts on the blades falls upon the projecting pins just described, and to relieve them from as much strain as possible, the ingenious arrangement of having movable ends to the casing was devised. The driving shaft which moves the drum passes through the large cylindrical journals on which the discs are hung. When the blower is put in motion the friction and binding of the shoes in the grooves of the discs is sufficient to make the latter revolve at nearly the same speed as the drum. The admission and discharge openings are respectively made in the casing below and above the line of tangency between the drum and casing.

As this is the first blower made on the Dougherty system, several features about its mechanical construction will probably be modified when more are made. The most serious defect which blowers constructed on this system have, is that of irregularly forcing out the air into the blast pipes. This is caused in two ways: first, by the rapid decrease in the effective area of the pushing blade as it nears the end of the stroke, with also the smaller surface of the drum, which is forcing the air by its approach to the casing; and, secondly, by the delivery of air to the blast pipes, which has been compressed between the blades of the drum before communication had been established with the discharge pipes.

ABSTRACTS OF LECTURES ON MINING.—No. XXI.

By Prof. W. W. Smyth, M.A., F.R.S., Royal School of Mines, London.

(*From the London "Mining Journal."*)

THE subject of our last lecture—the mode of paying the men—although apparently very simple, is a very important one, and leads to great difficulties if not thoroughly understood. The arrangements as to payment have to vary, as we saw, according to the conditions of the mine. But there is one point common to both kinds of work—that there is a free agreement on both sides for the men to do a kind of work which is described as accurately as may be at the outset, and it is for their interest, as well as for that of the managers, that it should be done in a given time. It is necessary that rules and regulations should be laid down and adhered to, as, for instance, in sinking or driving that the work should follow a certain definite direction, have a specified breadth, &c.; that the levels should be kept horizontal, or within certain limits of variation. The cases that we looked at particularly were those of our western districts, but the general principles are much the same in other parts. In the North of England the term fathom-tale is applied to the measurement by fathoms, or, in other words, to the tutwork; and if the payment be on the amount of ore raised, the term bing-tale is employed, a bing being the general measure of lead ore in the district, and equal to 8 cwt. In Saxony and Hungary similar methods of payment are adopted. But there are still one or two special points to be noticed. For instance, if a lode contain the metalliferous matter disseminated through it, as is the case with gold and tin, then the work would be by tutwork. There may be, however, places in the lode where, from the presence of nests or strings of ore, it is very much richer than usual. It is undesirable that this richer part should be mixed with the general mass of ore, and then have again to be separated, and a separate bargain is therefore made with the men as to such parts. In the Cornish districts it is found advisable to drive the level not in the lode itself, but in the country by the side of it; and this plan is especially desirable in cases where you get a very rich class of work, substances of high intrinsic value, as gold and silver. The level is driven in the country by the side of the lode by one set of men on the tutwork system, and then, when the material from the level is cleared away, the lode itself is broken down from time to time, and collected separately. This is done according to special bargain, either by the same set of men, or by another set, and the lecturer had seen good service done in removing the lodes by employing a set of somewhat better educated youths. In gold and silver workings there is great temptation for the men to pick up pieces of the ore, and it is best not to put this temptation in their way by giving them the whole work to do at once. Another reason for this method is to be found in the fact that in some districts (as in that of St. Just) the lode is of such a character that much more rapid progress can be made in driving through the country by the side. The agreement for taking away the lode will usually be by allowing them so much for every ton, or so many shillings for every pounds worth. It is easy to conceive several circumstances in which it is desirable to adopt some such measure as this.

We may now take a sort of general view of mining operations as they are more or less contrasted with one another, and of the various ways in which they are represented in plans and sections. The general arrangement of working in a colliery or bedded deposit is likely to be very different from that which is usual in metalliferous mines, in consequence of the regularity attached to the one kind of deposit as compared with the other. In the case of a colliery or bedded iron-stone deposit, we can at the commencement of the working reckon on its being continued over a moderately large area, with sufficient regularity to enable us to calculate beforehand what is likely to be the output from a given part. The question is only one of a mechanical nature, how best to get at the deposit, and then how best to remove it. But the case is very dif-

ferent when we come to deal with a metallic mine; the working may be regarded as more or less regular after a time, but during its progress it is to be looked on as only a series of trials and experiments made one after another. In the commencement of such a mine it may take at first an extremely simple character; as, for instance, the driving in of a level from a hill-side, either along the lode or in order to intersect it. Then, when it became difficult to ventilate the end of the level, a shaft should be sunk from the top for this purpose; and levels might then be multiplied and extended, till a second shaft was requisite, when one of these should be employed for pumping, the other for hauling. But if at any time the driving of the levels in different directions show that the workings are not likely to be successful the whole will have to be given up, so that, in fact, the working resolves itself into a series of experiments, of which those which are unpromising must be abandoned. And this character must be kept constantly in mind in commencing a mine; it is unwise to go to a great expense at once in engines adapted for large depths, &c., but to add these by degrees as the mine establishes itself, taking care in the outset to introduce, as far as possible, apparatus which may subsequently subserve some secondary purpose. Moreover, in consequence of the irregularity of the deposits, it may be necessary in the case of large workings to have to change the chief seat of operations several times, according to the disposition of the mineral; and, therefore, the probability of this must be considered when setting up appliances in any one particular spot. And in this respect there is great difference from the extensive plant and perfection of the apparatus connected with a large colliery, where there is no likelihood, or necessity, for any such change in the course of operations. Sometimes, instead of putting up fresh machinery at the different shafts of the metal mines as they are opened, the existing engines are made to do their work at considerable distances by means of flat-rods, chains, and pulleys. All these things have to be taken into consideration in the sinking of shafts and the arrangement of underground workings. The shafts in the collieries are openings nearly or quite perpendicular; in the metalliferous mines they are either carried down in the lode itself, or sunk perpendicularly, for the purpose of intersecting the lode at a certain depth. Sometimes partly from accident, partly from richness of the ground in certain parts, partly from the nature of the ground, you see a number of shafts very close together, which, looked at *ex post facto*, seem quite unnecessary to be so crowded, and were evidently attended with very great expense. As a general rule it may be said that such cases would not have resulted if one could have known beforehand what the working would be likely to be worth. In the case of the celebrated Comstock lode, for example, you see such an aggregated number of shafts that it is evident at once there has been a very great deal more expended on this dead work than was really required, only it was thought that it was necessary to work the lode in so many separate portions. The course of the works may be thrown quite out of their original direction by the fact of the shoots of ore extending in directions different from that they took at the commencement. In such a case it will be necessary to sink fresh shafts, to intersect the direction in which the main axis of the shoot is tending; or if the ground be not of sufficiently promising character to warrant that expense, an oblique shaft will be sunk in the axis of the shoot itself. This is altogether a class of workings which does not occur in working stratified deposits.

In one system of working the coal deposits the preliminary workings are carried forward of a comparatively narrow character by the driving out of levels on what is termed by the miners the water level—that is, a line nearly or quite horizontal. Sometimes two, sometimes three or four, of these galleries run along parallel to each other. Then a second class of workings commence up the incline of the seam, feelers as it were, having the important object of opening out the ground for the subsequent wider working, and also to some extent draining the whole coal of gas before these wider workings come into play, and in the third instance serving afterwards as permanent roadways. All this, it will be seen, is preparatory and exploratory. In the other system this opening of the ground is not carried forward to such an extent, but along with this exploratory work goes a partial working of the coal by means of successive openings, locally termed "bords." The levels serve as roadways, and are connected by cross-cuts at intervals for the purpose of ventilation, and thus you have the ground cut up into a series of pillars. The getting of the mineral on a large scale has to be preceded in both systems by a large amount of preparatory work, which in some instances may be remunerative, removing one-third or one-fourth of the coal, leaving the rest for subsequent working. In the collieries you may generally expect, almost universally, a large amount of regularity, and as a rule the ground is easy to cut so that the workings may be carried on with much facility, and you are able to calculate how long it will take to get to such a boundary, or to cut a certain quantity of coal.

In metal mines the case is different; the rock is generally much harder. A full complement of men will, perhaps, be able to advance not more than 1 fathom a week—2 fathoms is very good work indeed—and 1 or 2 fathoms a month is very fair. The ground is so hard that the plan of the mine must be settled long beforehand; allowance must be made on the other hand for the fact that the circumstances may so change as to change the plan of the work; to give each of these considerations its due attention is sometimes like steering between Scylla and Charybdis. There ought to be a calculation of what should go forward for some years ahead, and to this end a great amount of liberty should be allowed to the manager by the shareholders, who are not so well acquainted with the special circumstances of the mine. From the slowness with which the operations proceed, the manager ought to have his eyes thoroughly about him, and see years beforehand what he intends to do, where shafts should have to be sunk and levels driven, in order that the working might run on together. The lecturer had never seen this so well exemplified as in the management of the Devon Great Consols Mine, by Captain PUCKEY, who in his reports had always a plan of something or other to be carried out, three or four years ahead. And this necessity is especially marked if there are several lodes to be dealt with. Another point of great importance is the necessity for always keeping a large proportion of the men at work on these exploratory or preparatory operations in the sinking of shafts and driving of levels. You often find it to be the case that when persons not conversant with mining enterprises and mining arrangements step into anything connected with the management of a mine, as directors or otherwise, they have a great notion of stopping the levels and shafts as soon as the mineral wrought in them ceases to pay. It may be relied upon as an axiom in vein mining that so soon as you see your ends stopped in this way—and the same may be said of the shafts—you are almost certain to observe that the mine itself is coming to a close. For although you may have behind you very good removable ore, unless you open out the ground in front in order to search for fresh deposits, owing to the capaciousness of the lodes, your workings are pretty sure soon to come to an end. Always observe, therefore, whether the shafts and levels are advancing well beyond the ground which is in progress of being worked. It depends on the nature of the ground and the circumstances of the mine how far in advance the levels should be carried. In Cornwall distances of 20, 40, 50, and even 100 fathoms have been driven in dead ground before a favorable result was again observed.

As regards the representation of the mines on maps and plans, the matter is very simple respecting collieries, the workings there being deferred to a horizontal plane. The part representing the coal withdrawn is, in some cases, colored dark, in others the pillars left have the darker tint; faults are marked in with a yellow line, and the course of the ventilation is indicated by arrows Managers of collieries are required by Act of Parliament to prepare their plans on a scale of two chains to an inch. It is usually the case in our British metal mines, and in many foreign ones, to represent the lodes or levels by single colored lines in plan—the lines being drawn straight between points in the lode, determined by the theodolite, or compass. The line on the plan, therefore, strictly indicates a line in the lode, and not necessarily the continuous axes of the lode, hence the great irregularity these lines sometimes present. A number of these single lines together cause very great confusion; it conduces much to clearness to indicate the levels by means of double lines filled up with color. A better plan is that adopted at some of the Hungarian mines, where the double lines indicate the actual walls of the level, and where certain signs indicate the means of securing the levels in those parts, or other details. The plans are often accompanied by a vertical section of the workings, or their projection on a vertical plane. The scale of the drawings not being fixed by Act of Parliament varies very much, 8 or 10 fathoms to the inch is often used; if a representation on a large scale is required, 5 fathoms to the inch is adopted.

The lecturer then referred to and exhibited a beautiful drawing of the Belgian coal field, by MR. THIMM, showing the range of the beds between certain levels over the district.

FIRES IN MINES: THEIR CAUSES, AND THE MEANS OF EXTINGUISHING THEM.*

By Richard P. Rothwell, Mining Engineer, New York.

(*Continued from page* 361.)

MEANS ADOPTED FOR PREVENTING MINE FIRES.

HAVING thus reviewed the principal immediate causes of mine fires, it remains for us to mention the means adopted to prevent these causes from producing their natural effects, and, finally, to investigate the means of extinguishing fires when they do occur.

The mere mention of the causes of mine fires suggests in most cases the preventives to apply. Where the cause is carelessness, there must be strict and judicious rules and careful inspection; this will prevent many of these and other accidents that make the miner's calling a somewhat dangerous one. Ignorance of the nature and full bearing of the immediate causes we have just mentioned is the ultimate cause of most "accidents." Carelessness is usually, though not always, the result of ignorance of the results that may spring from the careless act. For example, it is too often either not known, or if known, not fully appreciated, that though the wood over the boilers is not at first easily ignited, and the new setting of the boilers allows no undue escape of heat or sparks, yet the wood in time becomes like tinder, and the walls supporting the boilers are liable to crack, and the accumulation over the boilers of coal dust and possibly of light wood fibres, from the timber supporting the roof, create a constantly increasing danger. The fire that results from these favorable conditions can scarcely with propriety be called accidental, though that term may satisfy the unquestioning faith of that patient and exemplary class, the stockholders of the mining company.

In fiery mines the practice of shot-firing is the cause of many explosions and fires. In anthracite coal it would seem at present as if the use of some explosive were absolutely essential for the economical getting of the coal, yet substitutes for explosives have been proposed and are actually in use for many purposes, but no effort seems to have been made by the owners of fiery anthracite mines to investigate or test such substitutes, or to encourage the invention of others. They seem to rest satisfied with taking the precautions which experience has shown to be sufficient, in most cases, to control and extinguish fire when once ignited, but which experience has also fully demonstrated to be unequal to some emergencies or to be subject themselves to unavoidable accidents.

Of course it is in but comparatively rare cases that underground boilers, or ventilating furnaces, or powder shots, result in fires, but the enormous loss incident to a mine fire makes the risk from these rare cases much too great to be undertaken by prudent managers; and so far at least as underground boilers and ventilating furnaces are concerned, they are quite unnecessary risks. Steam can be carried to considerable distances (say 1,500 to 2,000 feet) through properly protected pipes, without any very great loss from condensation. Boilers on the surface are so much more economical in installation and in running expenses, as, generally, to compensate for this loss of steam; and where steam cannot be used—and in most cases where it can—compressed air forms a perfectly safe and equally efficient means of transmitting power. Compressed air is not an economical motor as compared with the direct use of steam, but it is a safe and convenient one for mine use; and after its use in the underground engines it serves for ventilation, while the exhaust steam is exceedingly injurious to the timber, and in some cases to the roof rock of the mine.

Wire ropes can also be employed to advantage in some cases for the transmission of power in mines. Mechanical ventilators have been shown to be almost always more economical, and in every case more efficient, reliable and safer than furnaces for mine ventilation. There is consequently no necessity for incurring these risks of enormously costly conflagrations.

As already stated, the danger from spontaneous combustion of the coal in mines may be overcome either by a ventilation so active as to keep the temperature of all parts of the mine so low as to prevent ignition of the coal, or it may be prevented by an almost opposite course, viz., by cutting off altogether the ventilation of abandoned workings, so that, from the absence of oxygen, no combustion can take place. In mines where the coal is subject to spontaneous combustion, both plans are adopted, with more or less success. If it were possible to keep the abandoned works always open, to prevent falls, or crushing of pillars, or accumulations of fine coal in places where but little air can reach them, probably thorough ventilation would insure safety; but as these condi-

* A paper read before the American Institute of Mining Engineers, at the Washington meeting, February, 1876.

tions cannot be secured, it has been found safer to prevent altogether the access of air to the parts of the mine where conditions favorable to spontaneous combustion exist. The method of walling off the goaves or old workings is objectionable in many respects. If the mine produces fire-damp, the walling off merely creates a magazine of a most dangerous explosive gas in the mine. If a fall of roof occur in the goaves, it may force this gas out into the working parts of the mine, and cause explosions; or, in many ways, a small but sufficient quantity of air may be admitted to the walled-off space to sustain, in the most effective manner, the slow combustion which it is desired to prevent. In the south of France, where the beds are very large, and the coal subject to spontaneous ignition, the system of mining known as by "remblaise," where the space from which the coal is taken is filled with waste material, and the roof is allowed to settle down on this packing, has been found to be the only really effective preventive of fires from spontaneous combustion. The packing effectually excludes air, and consequ-ntly no combustion can take place. No other system of mining than that of taking out all the coal, and either allowing the roof to fall as the work proceeds, or of filling the space from which the coal has been taken, is adapted to working in coals of this character. In chamber and pillar work, the crushing of the pillars, which cannot be prevented, is a constant source of danger, for it presents the most favorable condition possible for the spontaneous ignition of the coal.

The most efficient preventives of fires in mines, from whatever cause they may come, is to be found in education—in increased knowledge of the causes of fires and a better appreciation of the working of these causes. Our mine managers should be obliged to pass strict examinations, and no one should be allowed to undertake the responsible duties of this place without a certificate of competency, given by a qualified board of examiners. Nor is it sufficient that the managers alone should be better educated: the miners themselves should be taught the causes and preventives of the dangers they meet with in their work. Special free instruction upon these points might be furnished at every colliery, and this could doubtless be accomplished by encouraging the giving of popular lectures, by practical miners and engineers, on subjects of interest to the miners, and by the giving of small prizes to those who pass the best examinations on subjects of daily practical application in their calling. I am well aware of the difficulty of exciting any interest among the majority of our miners in anything that is not actually their "bread and butter." They care little for the dangers they encounter, and do not appreciate the importance of knowing more than how to swing a pick or use a drill, and but little even of these accomplishments. Nevertheless, I believe that the leaven of a small percentage who would profit by such instruction would finally leaven the whole mass, and the practical results of the increase in knowledge would be apparent in greater care and better mining even by those who had not taken any part or interest in the lectures. Greater knowledge always makes better workers, and the mine-owners would find in this a good return for the small expense incurred. No startling results are expected from this suggested plan. A pretty intimate acquaintance with our mining classes long ago dissipated the expectation of bringing about a millennium in the mining regions by means of education and instruction such as we have here suggested, but I nevertheless believe the modest results anticipated would abundantly justify the trial of some such plan as this.

MEANS ADOPTED FOR EXTINGUISHING FIRES.

With all the precautions that the present condition of our knowledge suggests, fires will sometimes occur; and as there is, unfortunately, no prospect of the immediate application of all the preventives that we do know, fires in mines will continue to be common accidents. We will now review the more important means proposed for extinguishing them.

When blowers of fire-damp ignite in a mine, they can sometimes be beaten out with wet cloths. In some instances the sudden vibration of the air, caused by the discharge of a small cannon, has been found quite effective. This remedy is applicable only when the fire has not had time to ignite the coal, and when the discharge of explosive gas is limited to the confined space on fire. When the burning gas cannot be beaten out by the vigorous application of wet cloths, carbonic acid applied by portable fire-extinguishers (such as the Babcock, the Connolly, and others) can be used with advantage, as has been done in Pennsylvania during the past few years. The carbonic acid, in addition to excluding oxygen from the fire, tends, in expanding rapidly, to cool down the inflammable gas to a point below the temperature of ignition: the force with which it is thrown against the burning gas also exerts a powerful extinguishing influence. The portability of these extinguishers, which are easily carried (like a knapsack) on the back, enables the workmen to take advantage of every current of air, and to apply the extinguisher wherever it will prove most effective. When once the fire has obtained such headway as to make it impossible to approach it close enough to allow the carbonic acid gas being thrown directly on it, recourse must be had to water, which, under a heavy head or pressure, can be thrown to a much greater distance than the extinguishing gas. Moreover, the carbonic acid would quickly make the air of a narrow heading irrespirable if the ventilation were not active; and if active, the fire would extend too rapidly. This objection does not obtain against the use of water: it can be thrown from a considerable distance and with great effect. A single example will suffice. The Prospect shaft, near Wilkes-Barre, Pa, already mentioned in this paper as an exceedingly fiery mine, is also a very dry one, scarcely any water being made, though the depth is 600 feet, and the gangways run out very near, if not quite, under the Susquehanna River. In order to combat successfully the fires that occur there so frequently from the ignition of fire-damp by shot-firing, the general manager, Mr. FREDERICK MERCUR, an engineer of great experience and ability, had a pipe laid along each gangway (when the work was confined to driving gangways and their parallel airways), and strong rubber hose attached to the end, and at other points along the line of the pipe. The shaft-end of this 2½-inch pipe connected with a column-pipe, leading down the shaft from a reservoir on the surface. This gave somewhat more than 600 feet of head, or 260 lb. per square inch pressure on water leaving the hose, a force sufficient to throw it with great force to a considerable distance. When the gas became ignited the water was immediately turned on (everywhere being kept constantly ready for such emergencies), and a few minutes usually sufficed to extinguish a fire that with less experienced men would have been considered ample cause for the abandonment of the works.

The skill which men engaged in this work of fighting fire acquire with experience, is not the least important element in the success which has generally attended Mr. MERCUR'S management of this trying colliery. But even experience and ability have at times been foiled by unexpected events, such as the breaking of the pipe leading down the shaft, and other less important mishaps, which caused the few minutes' delay that were all-sufficient to give the fire an irresistible and unconquerable force. In consequence, the mine, though a new one, and not yet worked upon a large scale, has twice had to be drowned out to extinguish fires occasioned in this manner.

The Pine Ridge shaft (400 feet deep), also near Wilkes-Barre, is scarcely less fiery than the Prospect, and as it makes a large amount of water, it was found sufficient to tap the base of the column-pipe from the pumps, and to lead the water, as in the other case, along the gangways in iron pipes, with attachments for rubber hose at intervals in those parts of the mine where fires were likely to occur.

When a fire has fully ignited the coal and obtained such headway that it is impossible to overcome it promptly by these means, a more systematic method of attack is adopted. The fire must be confined by temporary bratticing or walls, so as to exclude air; the points of attack are approached in regular siege manner, a temporary batticed approach being kept open and ventilated with a special fan; from this heading the men direct streams of water on the fire, and as they partially extinguish it, the loose coal is removed, and access given to portions still burning. The work is exceedingly arduous and dangerous, and the least interruption in it allows the fire to recover the ground that may have been gained from it. A better example of fighting a fire in this manner can scarcely be cited than that of the Empire Mine fire near Wilkes-Barre, Pa., which was fully described in the report, for 1874, of the very efficient State mine inspector for the district, Mr. T. M. WILLIAMS. In the same report is an account of the old Baltimore Mine fire, and the one in the Prospect shaft, to which reference has already been made.

In the case of the Empire fire, water was thrown upon it from no less than six underground pumps, and worked upon by a force of five or six hundred men, directed by the greatest experience and energy, for four or five months, yet one accident or another always prevented the final extinguishment of the fire. It may, therefore, be assumed as proven that, when a fire gets beyond a certain stage, in most cases, it cannot be extinguished by throwing water upon it. The difficulties can be understood by a reference to the mode of fighting a conflagration in an anthracite mine. Let us imagine a fire in the chambers in a large anthracite vein, the pillars of coal all aglow and burning fiercely. When a stream of water is played on this incandescent mass, a portion of the water is decomposed into hydrogen and oxygen, and probably this latter and a portion of the oxygen of the air form with the coal CO. This hydrogen and carbonic oxide burn again on the admission of air, making explosions sometimes of considerable violence. The pillars "spall off," and the pieces accumulate around their base in a mass of burning coal, so deep as to be impenetrable by the water, and therefore impossible to extinguish, so long as it gets the very small quantity of oxygen requisite to maintain slow combustion. The roof-rock breaks down also under the action of water and heat, and covers still further the burning pillars of coal, till finally the fire is under an immense covering of broken coal and rock. In this manner the men will sometimes be quite above the coal-seam, standing on the pile of waste coal and rock that has accumulated from such falls. It is then impossible to reach the seat of the fire except by laboriously attacking by regular approaches on the foot-wall, and carrying away the entire mass of rubbish as it is cooled by the stream of water. Since the fire generally occurs in "old workings," the pillars are not much more than sufficient to support the roof, and in most cases timber props have also to bear a portion of the superincumbent load. As the wooden props quickly burn out, the strain on the pillars is increased, and the spalling off, produced by both the heat and the water, soon brings them to the limit below which they will no longer support the roof, and a general crush occurs. After this there is no possibility of overcoming the fire in this manner, and the attempt is abandoned.

TO BE CONTINUED.

NOTES.

LEAD POISONING.—In a late number of *The Lancet* a somewhat singular case of cumulative lead poisoning is reported. A cab-washer was the subject. He stated that, as he usually finished his work just as the public-houses opened, he always had the very first glass of beer or gin that was served in the morning; that is to say, the liquor which had remained all night in the draw-pipe in contact with the lead. His gums showed the well-known blue line indicative of lead poisoning, and other confirmatory symptoms existed which need not be detailed here. From the beginning of June to the beginning of December he was treated with iodide of potassium in large doses, and was galvanized and faradized daily, but all to no purpose. Finally, on December 4th, he was placed in a warm bath, and the water charged with twenty-eight cells of a voltaic battery. At first the current was passed from the positive pole, placed at the nape of the neck, to the negative, which was placed at the feet. After ten minutes the negative pole was moved along his legs and arms for twenty minutes more. The treatment was continued daily, and at the end of a fortnight he was so much better as to be able to raise his arms fairly, and flex them pretty well. From this time he continued to mend, the baths being still kept up three times a week, and finally returned to his work in February. The fourth bath was acidulated and tested by Dr. HANDFIELD JONES, who found well-marked traces of lead in it, which were absent in the water supplied to the bath. If lead can be thus eliminated from the body by the electric current, why not arsenic, mercury, and silver? In ordinary cases of lead colic and dropped wrists the electric bath has proved efficacious in a few days without any medicine.

NEW DEVICE FOR RAISING WATER.—M. Th. FOUCAULT has invented a new apparatus for raising water by means of ammoniacal gas. The machine depends for its operation on the facts that water at 15° C. absorbs 743 times its volume of ammoniacal gas, and gives it off again at 60° C.; that, at 100° C., the tension of the vapor is seven and one-half atmospheres; that petroleum and ammoniacal gas are without action upon each other; and that the same is true of petroleum and water. The apparatus consists substantially of a heater which is partially filled with a strong aqueous solution of ammoniacal gas. This heater is connected by pipe with the upper part of a closed reservoir, the lower part of the reservoir being connected by means of pipe and suitable valves with the stream or well from which, and the tank to which, water is to be raised. The reservoir contains a small quantity of petroleum, which forms a thin stratum on the surface of the water, and serves to keep the ammoniacal gas from contact with it, and, as the inventor expresses it, forms a fluid piston. The operation is as follows:—Supposing the reservoir full of water, the temperature of the heater is raised by suitable means; ammoniacal gas is given off, and passes over into the upper part of the reservoir, the stratum of petroleum preventing its being absorbed by the water there. A pressure is thus created in the reservoir, which forces the water there out and up to the tank to be filled. When all the water has been forced out of the reservoir, the heater is cooled by removing the fire and allowing a jet of water from the tank to play on it. The water in the heater, as it cools, reabsorbs the ammoniacal gas from the reservoir and thus creates a vacuum, which the water from the stream or well rushes up to fill, and thus refills the reservoir. The heater is then again heated, and so on, as before. The inventor claims that the consumption of fuel is almost insignificant as compared with that of a steam-pump of the same capacity. The author also describes a modification of his apparatus adapted to be run by the heat of the sun, in which case the only expense is that of wear and tear, which is small, there being no moving parts.

THE MINERAL WEALTH OF JAPAN.*

By Henry S. Munroe, E.M.

(Continued from page 379.)

PRODUCTION OF COAL IN 1874.†

District.	Tons of 2,240 lb.
Takashima Island, Nagasaki Harbor	72,430
Müke Mines, Müke Coal Field	66,324
Imabuku District, Karatsu Coal Field	32,567
Taku " " " "	22,198
Karatsu " " " "	58 288
Hirado " " " "	63,160
Rest of Japan estimated at	74,933
Total	390,000

Analyses.—I add some assays and ultimate analyses of Japanese coals, made by me some years ago.‡ The specimens from Yesso either were carefully sampled from large quantities of coal, or were selected to represent the average quality of the different beds. The others were merely hand specimens, and the results are, therefore, less reliable.

Geologically, petroleum seems to be confined to the clay rocks of the Toshibetsu group. In Yesso, where certain oil regions were examined in the course of the Geological Survey, this is certainly the case*; and the few deposits I have met with on the main island are also in the same group of rocks. According to Mr. LYMAN'S reports,† the oil regions of Yesso are quite insignificant and hardly worth working; which, indeed, seems to be the case in most of the oil regions of the country.

In Yesso, oil occurs at three places: at Yamakushinai, in the province of Iburi; and at Washinoki and Idzumisawa, in the province of Oshima.

At Idzumisawa, near the sea-shore, twelve and a half miles west of Hakodate, several shallow pits were dug through the alluvium, from the sides of which, in some places, a little oil was seen to ooze, probably derived from the clay rocks below. The oil-bearing bed here seems to be but ten feet thick; and the maximum daily yield of one of these wells was but about half a gallon of very thick, tarry oil, marking 11° Baumé. No deep wells have yet been sunk.

At Washinoki, also in Oshima province, but on the shore of Volcano Bay, similar shallow pits were dug in the gravel, some of which reached the clay rock; these wells yielded in some cases but a trace of oil, and in others half a gallon to one gallon per day. This oil was also thick, marking 15° Baumé. A pit, sixty or seventy feet deep (?), has been sunk through the soft clay rock in this vicinity, since the time of the survey; and a daily yield of fifty gallons of oil was obtained. The oil is also said to be much lighter than that found near the surface. The report, however, lacks confirmation, and it is possible that the yield has been somewhat exaggerated. Mr. LYMAN reports two oil-bearing beds about, two hundred feet apart, each ten feet or less in thickness.

JAPANESE COALS.

KAYANOMA COAL FIELD, YESSO.

No.	Name of Coal.	1 Moisture at 140° C.	2 Volatile combustible.	3 Fixed carbon.	4 Ash.	5 Ratio of fixed carb. to vol. comb.	6 Color of Ash.	7 Per cent. of coke.	8 Ash to 100 of coke.	9 External appearance of coke.	10 Specific gravity of coal.	11 Weight of 1 cub. ft. solid.	12 Cub. ft. required to stow 1 ton 2,240 lb. broken.
1	Midzunuki coal, average samples....4'0 ft.	3'73	33'03	41'76	21'48	1'264:1	Dk.reddish-brown	73'78	31'95	Good.	1'446	90'38	38 to 46
2	Houshiki coal, upper bench..... 6'4 "	5'71	39'94	50'63	3'72	1'268:1	Light brown.	54'35	6'84	Very good.	1'266	79'09	44 " 52
3	" " lower bench.....1'3 "	5'51	33'39	46'03	14'07	1'379:1	Light lavender.	60'10	23'41	Fair.	1'340	83'76	41 " 50
4	" " average sample from mine	5'36	35'95	46'11	13'08	1'283:1	Light brown.	59'19	22'10	Very good.	1'351	84'44	41 " 49
5	" " " " from "dump"	4'12	34'88	45'26	15'74	1'298:1	" "	61'00	25'80	" "	1'363	85'19	41 " 49
6	Tateire No. 2, upper bench.....1'9 ft.	5'63	32'22	49'38	12'77	1'533:1	Reddish brown.	None.	.....	.....	1'355	84'69	41 " 49
7	" " middle bench.....1'1 "	3'43	25'63	36'06	34'86	1'407:1	White.	"	.....	.....	1'539	96'19	35 " 43
8	" " lower bench .. ..0'7 "	5'66	33'68	48'71	11'95	1'417:1	"	60'66	19'70	Fair.	1'346	84'13	41 " 49
9	" " average sample from mine	5'06	29'93	41'50	23'51	1'386:1	Brownish-white.	65'01	30'16	Very poor.	1'411	88'20	39 " 47
10	Kosawa No. 4, upper bench.....1'6 ft.	12'98	41'84	35'05	7'13	0'909:1	Pink.	None.	.....	.....	1'359	84'94	41 " 49
11	" " middle bench.....1'7 "	12'71	44'97	36'55	5'77	0'813:1	"	"	.....	.....	1'367	85'44	40 " 48
12	" " lower bench.....1'0 "	6'19	31'75	44'42	17'64	1'284:1	Reddish-brown.	"	.....	.....	1'408	88'00	39 " 47
13	" " calculated average of bed	11'51	41'07	38'73	8'69	0'906:1	Light-brown ?	"	.....	.....	1'372	83'55	41 " 50
14	Osawa No. 6, upper benches.....3'9 ft.	5'43	41'43	43'36	9'78	1'047:1	Reddish-brown.	53'14	18'40	Good.	1'286	80'04	43 " 52
15	" " lowest (?) benches...1'5 "	4'85	25'30	29'79	40'06	1'17 :1	White.	None.	.....	.....	1.589	99'30	35 " 41
16	Osawa No. 9, 6th branch.....1'4 "	6'75	39'03	42'57	11.65	1'091:1	Light-brown	54'22	21'47	Fair.	1'347	84'19	41 " 49
17	" " 5th " .....1'2 "	5'66	41'47	46'44	6'43	1'120:1	" "	52'87	12'16	Good.	1'301	81'25	43 " 51
18	" " 4th " .....1'8 "	9'40	38'66	46'47	5'47	1'202:1	Light ochre.	None.	.....	.....	1'296	81'00	43 " 51
19	" " 3d " ... .1'4 "	9'55	35'80	49'71	4'94	1 388:1	Pink.	"	.....	.....	1'316	82'25	42 " 50
20	" " calculated average of bed.	8'03	38'60	46'29	7'08	1'200:1	Light brown ?	? ?	.....	Very poor ?	1'315	82'18	42 " 50
21	Ogurasawa No. 3, upper bench.....2'0 ft.	6'43	35'33	38'44	19'80	1'088:1	White.	None.	.....	.....	1'400	87'52	40 " 47
22	" " middle bench.....4'0 "	7'86	33'03	39'28	17'83	1'121:1	" "	"	.....	.....	1'410	88'15	39 " 47
23	" " lower bench.....1'4 "	5'91	36'27	33'98	23'84	0'937:1	" "	"	.....	.....	1'423	88'88	39 " 46
24	" " calculated average.....	7'04	35'37	37'97	19'62	1'074:1	" "	"	.....	.....	1'410	88'15	39 " 47
25	Furushiki No. 3.....	1'14	28'44	54'53	15'69	1'914:1	Lavender.	70'22	22'20	Excellent.	1'326	82'88	42 " 50
26	Chatsunai, Onkosawa No. 1, 5 ft bench....	10'85	39'63	43'46	6'06	1'097:1	Reddish-brown.	None.	.....	.....	1'334	83'38	42 " 50

ISHIKARI COAL FIELD, YESSO.

27	Horumui No. 1, 4'2 ft. Marked (L 576 i)..	5'62	39'88	52'32	2'18	1'312:1	Dark umber.	54'50	4'00	Very poor.	1'284	80'25	43 to 52
28	" " 2, 5'0 ft. " (L 602 a).	5'19	37'51	54'84	2'46	1'281:1	Bright orange.	57'30	4'03	Poor.	1'281	80'06	43 " 52
29	" " 3, 1'9 ft. bench (L 602 ba)..	4'20	40'42	51'99	3'39	1'286:1	Orange-yellow.	55'38	6'12	Good.	1'277	79'80	43 " 52
30	" " 3, 5'0 ft. " "	4'25	41'26	52'08	2'41	1'262:1	" "	54'49	4'44	Fair.	1'286	83'75	43 " 52
31	" " 3, calculated average.....	4'24	41'01	52'05	2'70	1'269:1	" "	54'75	4'93	Fair ?	1'283	82'37	43 " 52
32	" " 4, 2'0 ft. bench (L 602 ca)..	5'03	38'29	53'31	3'37	1'131:1	" "	56'68	5'93	Fair.	1'305	81.57	43 " 51
33	" " 4, 2'7 ft. " "	4'58	40'67	50'45	4'30	1'240:1	" "	54'75	7'85	Good.	1.304	81'52	43 " 51
34	" " 4, calculated average.....	4'85	39'24	52'17	3'74	1'174:1	" "	55'90	6'67	Fair.	1'305	81'55	43 " 51
35	" " 5, 5'0 ft. Marked (L 603 e)..	4'47	40'80	52'08	2'65	1'276:1	Yellow.	54'73	4'84	Good.	1'282	80'14	43 " 52
36	" " 6, 4'0 ft. " (L 603 g)..	8'48	37'52	51'57	2'43	1'108:1	"	None.	.....	.....	1'323	82'69	42 " 50
37	Sorachi No. 1, (Bussankioku collection) ..	2'93	35'03	59'05	2'99	1'686:1	Light yellow.	61'02	4'82	Very good.	1'279	79'74	43 " 52
38	" " 2 or 3 " (Admiral Enomoto)	2'89	35'77	59'02	2'32	1'650:1	Orange-yellow.	61'34	3'78	" "	1'272	79'48	43 " 52

COAL FROM OTHER PARTS OF JAPAN.

	NIPPON.												
39	Liguite, Kadzuno Mines, Akita Ken.....	14'35	27'14	56'08	2'43	2'066:1	Lavender.	None.	.....	.....	1'338	83'62	41 to 50
40	Hiyamidzu coal, Iwaki coal field.....	9'84	38'47	41'52	10'17	1'079:1	Brownish-white.	"	.....	.....	1'380	86'22	40 " 48
41	Funakimura coal, Yamagouchi Ken.....	11'49	33'13	51'44	3.94	1.552:1	Pink.	"	.....	.....	1.337	83'56	41 " 50
	KIUSIU.												
42	Karatsu coal, Karatsu coal field.....	2'69	40'13	47'12	10'01	1'174:1	Yellow.	57'13	17'50	Very good.	1'349	84'31	41 to 49
43	Takashima coal, Nagasaki ken,.....	1'32	38.13	55'45	5'10	1'454:1	Pink.	60'55	8'42	Excellent.	1'260	78'78	44 " 53
44	Gas coal Miike coal fie'd.....	0'54	38'51	43'36	17'59	1'126:1	Red-brown.	60'96	28'86	"	1'335	83'44	41 " 50

ULTIMATE ANALYSES AND CALORIFIC POWERS.

	1 Midzunuki coal (mine.)	4 Houshiki coal (mine)	5 Houshiki coal (dump.)	9 Tateiri coal (mine.)	25 Furushiki coal. No. 3.	28 Horumui coal. No. 2.	36 Horumui coal. No. 6.	37 Sorachi coal. No. 1.	39 Kadzuno lignite.	42 Karatsu coal.	43 Takashima coal.	44 Miike gas coal.	Average of 12 Japanese coals.	Average of 8 American* lignites.
Moisture	3'714	5'360	4'095	5'060	1'342	5'194	8'479	2'928	14'346	2'690	1'320	0'536	4'589	10'004
Carbon	57'689	62'221	64'412	56'283	69'049	72'982	68'842	77'040	62'149	69'436	78'633	69'280	67'585	63'531
Hydrogen	4'620	5'222	5'911	4'124	5'256	5'300	4 771	5'685	3'358	5'156	5'816	5'524	4'879	4'092
Oxygen and Nitrogen	10'144	10'118	9'940	10'271	7'172	13'841	15'180	11'014	16'395	11'920	8'721	4'888	10'800	16'299†
Sulphur	3'765	1'607	1'449	1'178	2'386	0'353	0'472	0'542	2'116	1'177	0'659	3'488	1'599	1'342
Mineral matter ‡	20'068	12'472	15'193	23'084	14'795	2'330	2'256	2'791	1'636	9'621	4'851	16'284	10'448	4'732
Total	100'000	100'000	100'000	100,000	100'000	100'000	100'000	100'000	100'000	100'000	100'000	100'000	100'000	100'000
Combined water	10'062	10'033	9'832	10'205	6'718	14'221	15'727	11'041	17'094	12'060	8'461	4'149	10'800	16'955
Free hydrogen	3'502	4'107	3'818	2'990	4'510	3'720	3'024	4'458	1'459	3'816	4'876	5'063	3'779	2'208
Calorific Power I§	5868	6654	6521	5577	7133	7179	6604	7782	5525	6927	[8035	7342	6764	5895
Calorific Power II ‖	5625	6373	6262	5351	6872	6895	6329	7492	5286	6664	7747	7072	6499	5644
Weight of water (at 100° C.) evap'd by 1 of coal { I¶	10'48	11'88	11'67	9'97	12'81	12'85	11'80	13'96	9'85	12'42	14'44	13'16	12'11	10'52
Weight of water (at 100° C.) evap'd by 1 of coal { II**	6'78	7'66	7'57	6'63	8'16	8'66	8'11	9'11	7'35	8'21	9'32	8'16	7'98	7'47
Temperature of combustion..	2,504° C.	2,476° C.	2,556° C.	2,510° C.	2,605° C.	2,578° C.	2,531° C.	2,627° C.	2,374° C.	2,581°C.	2,644° C.	2,615° C.	2,566° C.	2,473° C.

*Analyses made by the writer some six years ago—see ENGINEERING AND MINING JOURNAL, vol. XV., p. 322.

† Including nitrogen, 1'228.

‡ Mineral matter equals ash minus oxygen aborbed by iron of pyrites, or ash minus three-eighths the of sulphur.

§ Obtained by multiplying carbon and free hydrogen by their respective calorific powers—8080 and 34462.

‖ Obtained from I by deducting units of heat required to vaporize moisture, combined water, and water of combustion. (536.5 units for each unit of water.)

¶ Theoretical—obtained from Calorific Power II.

** Probable result to be obtained in practice.

PETROLEUM.

Petroleum is found in small quantities on the Island of Yesso; and more abundantly in numerous places on the northwest coast, and a few places on the south coast of the main island.

* A paper read before the American Institute of Mining Engineers, at the Philadelphia meeting, June, 1876.

† Official Estimates furnished by J. G. H. GODFREY, Chief of Mining Office.

‡ See American Chemist, Vol. V., page 120.

* Kaitakushi Reports, p. 595.

† Kaitakushi Reports, pp. 591 to 631.

At Yamakushinai, in Iburi province, also on the shore of Volcano Bay, and about twelve miles north of Washinoki, there is, according to Mr. LYMAN, a bed of oil-bearing rock probably ninety feet thick, containing, however, but little oil. In one shallow pit a daily yield of about half a gallon of oil, marking 11° Baumé, was obtained, and, at several other places, mere traces of oil.

These results would seem to show that these clay rocks of Yesso, though extending over a large portion of the island, only locally contain oil; and even then not in sufficient quantity to warrant working, except on a very small scale, by simple and inexpensive methods of exploration.

The same series of rocks, which, in Yesso, contain the oil-bearing strata, are found on the west coast of Nippon, in the ken of Awomori and Akita, and seem to extend along this coast southward through Yamagata and Niigata ken, and then, in a belt across the island, southward through Nagano to Shidzuoka ken on the southeast coast. Oil, in greater or less quantity, is found everywhere in this belt; but, as in Yesso, only locally, and usually not in workable amounts.

The most important oil region in Japan is that in the northern part of Niigata ken, producing more than nine-tenths of the total yield. From the catalogue of the Japanese Section, I take the following description of this region.*

Oil was first discovered in this province 300 years ago, and it has always been counted among the seven wonders of Echigo, that a natural combustible gas, issuing from the ground in certain places, could be brought through bamboo pipes into the interior of houses and used for illuminating purposes. This gas is now utilized under the small stills used for refining the crude oil. Although the presence of oil has been known for a long time, the people of the country only began to use it 46 years ago. Since then no less than 508 wells have been sunk in the district, some of them 400 and even 600 feet deep. The daily produce of these wells amounts to 900 gallons of two kinds of oil. One variety is of a light color, specific gravity 0·800, and contains 8 per cent. of light oil, 52 per cent. of lamp oil, 28 per cent. of heavy oil, and 12 per cent. of residue. The other is darker, specified gravity 0·930, with only 9 per cent. of lamp oil, 58½ per cent. of heavy oil, and 32½ per cent. of residue. The better quality of oil is burned by the people in primitive lamps, and the darker oil is used to some extent by the fishermen on their torches. Some years ago a company was formed for establishing refineries, but it was unsuccessful; another has since been formed, and is likely to turn to advantage these natural resources of the country.

According to Mr. PLUNKETT, over eighty pits have been sunk near Kurakawa in this district, one of which produced twenty to twenty-five gallons of oil per day. During the last six months of 1874, the yield of the district was 137,185 gallons.

I am informed that Mr. LYMAN has been engaged by the Government to survey this oil-field; and we must look to his report for further information.

Of the oil region in Nagano ken (Shinano), the Japanese catalogue says: "In Shinano, the daily produce of 39 wells amounts to 422 gallons, the greater part of which has a dark color and a specific gravity of 0·935, and only 13 per cent. of lamp oil. It is said that after the earthquake 29 years ago, the oil springs were considerably modified, both the yield and the locality of the springs being affected."

AMBER.

A fossil resin, resembling amber, occurs in small rounded masses in the coal and lignite of many localities in Japan. Near Kuji, in Kunohe kori of Iwade ken, such a fossil resin occurs; both in beds of lignite, and distributed through a soft greenish sandstone. This sandstone contains beds of conglomerate, and here and there thin laminæ of coal. The strata are nearly horizontal, dipping east about four degrees; and contain amber over an area of about two or three square miles.

The amber deposits is reached by vertical pits about fifty feet deep, at the bottom of which irregular workings follow the sandstone, which is mined and brought to the surface, where the resin is picked out or separated by washing. The pits are very badly ventilated, and neither lamps nor bamboo torches can be made to burn. Strange to say, the miners work for hours in this atmosphere, and are troubled only by a slight headache. One miner obtains from from twelve to fourteen pounds of amber per day; while the preliminary work of sinking the pit, requiring one hundred and fifty days' labor, costs but ten or twelve dollars.

The amber is of inferior quality, usually opaque or cloudy, and very much fissured. I could not learn to what use it is applied; but it is sent to Tokio, and is probably used for making ornaments. At the time of my visit, the miners had about a ton in stock awaiting order from Tokio. The field is nearly exhausted; but similar deposits are reported to occur in several other parts of Japan.

IRON.

Of the metallic minerals, the ores of iron are the most abundant. Nearly all the different ores are found in Japan, but magnetite and magnetic iron sand are the most important, being used almost to the exclusion of all others. Probably one-third, and perhaps one-half, of the iron made in Japan is produced from iron sand by a very interesting direct process, which I shall have occasion to describe at another time.

Iron Sand.—From an imperfect list of localities, compiled from various sources, I find that iron sand occurs in twenty-five of the thirty-five ken of the empire. According to the official list of mining permits, there were over four hundred different mines of iron sand worked in 1874. The volcanic and many of the metamorphic rocks contain magnetic iron in fine crystals; and, in the disintegration of these rocks by the action of the sea, the heavier iron sand is separated and forms beds of greater or less thickness on the shore. The old alluvium, formed in a similar way, but now elevated above the sea in high terraces, contains similar beds, often buried below thick layers of sand and clay. Finally, in many places, the volcanic or metamorphic rock contains so large a proportion of magnetic iron that it is found profitable to mine it and separate the iron sand by crushing and washing.

As an example of the first class, we may take the beach deposits of iron sand in Yesso. The following notes are condensed from Mr. LYMAN'S description in his preliminary report.†

Magnetic iron sand is found on the sea beach near Yamakushinai, in Iburi province, on the shore of Volcano bay; and near Kobui, in Oshima province, on the eastern extremity of the peninsula east of Hakodate. Iron sand occurs in many other localities; but these are the only workable places yet found.

The deposit at Yamakushinai is perhaps ten miles long, and averages twenty yards in width, with a mean thickness of about six inches, making a total of about 120,000 tons of pure ore. The ore, previously washed, was used, some twelve years ago, in a forge in the vicinity, for the production of iron by the Japanese process; but it was found difficult to smelt on account of the presence of titanic sand.

The iron sand of Kobui is said to be more easily smelted and seems to be purer. The deposit is, however, very small; amounting, according to Mr. LYMAN, to not more than 5,000 tons.

As an example of the occurrence of iron sand in the old alluvium, I will describe briefly the important deposits of Kunohe kôri of Iwade ken, which I visited in the fall of 1874. The ore deposits occur on an extensive sloping terrace or table-land, composed of metamorphic rock, mica schists, quartzites, etc., one hundred and fifty to three hundred feet about the sea, and everywhere covered by beds of yellow sand and sandy clays forty to fifty feet thick. The ore is a dark red sandstone, with thirty to fifty per cent. of iron sand in thin laminæ, or distributed through the mass. It occurs locally on the surface of the metamorphic rock and under the alluvium, in beds one to three feet thick. This sandstone, which is quite friable, is easily crushed, and the magnetic sand separated by washing.

The surface of the table-land is much cut up and eroded by small streams, and crossed in several places by deep valleys of larger rivers. The deposits of iron ore are in this way frequently uncovered, and secondary deposits are formed in the beds of the smaller streams. In many cases, however, the action of the streams merely removes so much of the overlying sand and clay, that the ore is found within twelve or fifteen feet of the surface.

Over the whole extent of this table-land, for a distance of fifteen to twenty miles north and south, and seven miles east and west, the ground has been explored by shallow pits. The productive beds being local and of limited extent, but a small proportion of these explorations have been successful. When, however, the miner is so fortunate as to strike a such a bed of iron sand, he burrows horizontal drifts in all directions and follows the bed until it becomes too thin to work; extracting the ore without system save to get as much as possible without endangering his own safety.

M. SÉVOZ, in the *Annals des Mines*,* gives an analysis of a Japanese iron ore which is interesting in this connection. The ore forms about two per cent. of a partly decomposed granite, from which it is extracted by washing. From the analysis this washed material is an impure magnetic sand, containing the proper proportion of ferrous and ferric oxides, six per cent. of titanic acid, twelve per cent. of silica, etc.

Magnetite.—The imperfect list of the places in which magnetite is found, compiled from various sources, develops the interesting fact that these localities lie in a belt extending from Iwade ken south and southwest to Sakai ken, a distance of more than three hundred and fifty miles. The northernmost place is in Hei gôri in Iwade ken. Here there are mines, seven to thirteen miles from the coast, which supply certain recently erected government blast furnaces. South of this several localities are reported in Miyagi ken. Still southward, the next deposits, one of which was examined lately by an American engineer, are in Fulaishima ken, where the ore is but five miles from the sea. Southwest, magnetite again occurs in Tochigi ken, and in several places in Gumma ken. At Nakakosaka in Gumma ken, not far from Tokio, an English engineer has recently erected a blast furnace. Still southwest, magnetite is reported to occur in the ken of Nagano, Gifu, and Sakai. Of these localities we know little or nothing, except that the ore of this southern end of the belt is reported to be of medium and inferior quality, as compared with that of the northern mines.

In addition to the above localities, magnetite of excellent quality is said to occur in Okayama ken, in the southwestern part of the main island.

From Mr. PLUNKETT'S report, and additional details furnished by Mr. GODFREY, I condense the following description of the deposits of Hei gôri in Iwade ken, where the Mining Office is building blast furnaces and preparing to produce iron on a large scale.

The principal iron mines are about thirteen miles from the coast, though deposits of ore have recently been found at half that distance. The magnetite occurs in vertical beds, twelve to fifteen feet thick, in a dark blue feldspathic diorite (quartzite or felsite?). The ores are rich and very pure, quite free from sulphur, and contain little or no titanium.

It is proposed to connect the mines, by a tramway eleven miles long, with the furnaces; and these with the harbor of Kameishi, two miles beyond, by a continuation of the same. The iron will be shipped to Yokohama or Nagasaki, and coal brought back as return freight. At present charcoal is used as fuel. Mr. GODFREY estimates the cost of producing iron here at nine dollars per ton; but this apparently does not include repairs, or interest on capital or sinking fund; while all the items, especially that of fuel, are placed very low.

At present the product is but 1,500 tons per year; this, however, will soon be largely increased. According to the catalogue of the Japanese section, 4 blast furnaces, calculated for a daily yield of 15—20 tons, and 12 puddling furnaces, with coke ovens, etc., will shortly be erected here. The full plant of a large rolling mill, including rolls, steam-hammers, etc., has been ordered from England, and is, according to M. DEBY, even now on the way to Japan.

In Fukushima ken, Naraha kori, magnetite occurs in beds twelve, fifteen, and even twenty feet thick. The ore is rich and generally quite pure; but sometimes contains sulphur in the form of pyrite, in objectionable quantity.

At Nakakosaka, in Kamura kôri, of Gumma ken, where Messrs. E. H. M. GOWER and J. A. R. WATERS, English engineers, have erected a blast furnace, the magnetite occurs in beds eight to eighteen feet thick, dipping about twenty degrees and interstratified with a dark blue quartzite (or felsite?). The ore is apparently of good quality, but has not yet been analyzed. An almost inexhaustible supply can be obtained at small expense by quarrying. According to Mr. GOWER, iron can be made here for nineteen dollars or less per ton. The fuel, charcoal, costs about two and a half times as much as at Hei gôri. The mines and furnaces are quite near a navigable river, by which the product can be brought directly to Tokio or to Yokohama.

Other Ores of Iron.—According to Mr. GEERTS,† specular iron ore is found only in Kagoshima ken; impure red hematite is more common, occurring in many places; limonite, massive and concretionary, and clay iron ore or kidney ore are also common and abundant. He gives a list of places, compiled from Japanese authorities, in which the ores are found; but says nothing of the extent or character of the deposits.

I have received many specimens of the above ores, and of bog iron ore; the latter not mentioned by GEERTS, but perhaps included under limonite. These ores are used to only a small extent for the production of iron.

TO BE CONTINUED.

* International Exhibition, 1876. Official Catalogue, Japanese Section, page 44.
† Kaitakushi Reports.

* Ann. M., Vol. VI., 1874; quoted by *American Chemist*, Vol. VI. p. 38.
† Transac. Asiat. Soc. of Japan, vol. III, part 1, p. 6, et seq.

THE CENTENNIAL COMMITTEE OF THE AMERICAN INSTITUTE OF MINING ENGINEERS.

EXPRESSIONS OF THANKS.

THE Centennial Committee of the Institute may well congratulate itself on the successful completion of its mission. The work devolving on its members, and especially on its efficient, laborious and amiable Secretary, Mr. WM. G. NEILSON, has been onerous, but it has brought with it its own reward. The expressions of thanks from both home members and foreign guests have been as profuse as sincere. That our friends from abroad have not forgotten the "Headquarters" on their return home, the following graceful and courteous letter from the *Verein deutscher Ingenieure* in Berlin amply testifies :

[*Translation.*]

SOCIETY OF GERMAN ENGINEERS (DIRECTION), November, 1876.

TO THE AMERICAN INSTITUTE OF MINING ENGINEERS, PHILADELPHIA : We have learned from many members of the Society of German Engineers of the extraordinarily high degree in which they were aided in the attainment of their objects during their visit to the International Exhibition at Philadelphia, by the kind and hospitable reception which they enjoyed from the American Institute of Mining Engineers, and how sincerely they feel the obligations of the warmest thanks. To give proper expression to this feeling is scarcely possible to each individual, since he must recognize that the courtesy was shown rather to the body to which he belonged than to himself personally. The undersigned managers of the Society of German Engineers (a society including many special organizations of technologists throughout Germany) feel themselves therefore compelled to express to the American Institute of Mining Engineers, on behalf of the German engineers in general, and its own members in particular, its warmest thanks for the cordial reception extended on the occasion of the Exhibition, and to add the expressions of its distinguished considerations.

Signed— THE MANAGERS OF THE SOCIETY OF GERMAN ENGINEERS.

Dr. F. GRASHOF, Professor at the Polytechnic School in Carlsruhe.
SIMON SCHIELE, Engineer, Frankfort-on-Main.
C. ISAMBERT, Engineer, Mannheim.
C. GAERBNER, Manufacturer, Buckau, Magdeburg.
A. REINECKER, Mine Owner, Bernburg, Anhalt.
E. BEOKER, Engineer and Manufacturer of Machinery, Berlin.
R. ZIEBARTH, Civil Engineer, Berlin.

NOTES.

NEWFOUNDLAND SILVER DISCOVERY.—A very valuable mine of silver has recently been discovered at Harbour Island, Newfoundland, near the public wharf.

QUINCY COPPER MINING COMPANY—SHIPMENTS FOR THE SEASON, 1876.—The net shipments of this company for the season of 1876 amounted to 3,634,640 pounds of stamp work and 121,210 pounds of masses, making a total of 3,815,850 pounds, or 1,907 tons, 1850 pounds of mineral. This is the largest shipment in any one year ever made by this mine.—*Mining Gazette.*

THE ANTHRACITE FUEL COMPANY'S WORKS, at the Port Ewen docks, shut down yesterday for the winter. This is the first season's operations of this industry, and though the works did not get into regular operation until about the first of July, the production has been upward of 16,000 tons. This, with about 9 000 tons made by the machinery of the canal company on the upper dock, makes the consumption of coal dust for this purpose this season equal to 25,000 tons. We learn that the fuel company will make a number of important improvements to their machinery this winter, and will largely enlarge their motive power, and thus increase their capacity. The experiment of handling coal-dust by an elevator has proved entirely successful, and the company's present elevator will be so adjusted as to perform the required work of discharging boats for both their systems of machinery. The number of men employed has been about thirty.—Kingston, N. Y., *Freeman*, Dec. 12th.

BUTTE, MONTANA, COPPER AND SILVER ORE SHIPMENTS FOR 1876.—The shipments of copper ore from Butte for the season just closed have amounted in the aggregate to 1,300,000 pounds of which the average per cent. of copper in these ores has been a little above 40, showing a value, at Salt Lake prices, of these ores sent to the States, of nearly $55,000. Independent of copper ores, there has been 700 000 pounds of silver ore, representing a value (estimated) of about $100,000, shipped to the East. These shipments combined sum up a thousand tons and show a value of over $150,000. To transport these ores to the railroad there has been paid to freighters during the season $35,000, or nearly 25 per cent. of their value. This heavy cost for moving ores a distance of less than 500 miles has prevented the shipment of hundreds if not thousands of tons additional of lower grade ores from this camp during this season, as, after paying all expenses for taking them to a market, the margin of profit has been too small to make it remunerative for miners to send other than their high grade ores.—*Butte Miner*, Nov. 28.

THE EUREKA, "NEVADA," MINING DISTRICT, ORE AND BULLION YIELD, according to the recent returns of the County Assessor, for the year ending June 30, 1876, is as follows :

For quarter ending,	Tons ore extracted.	Gross yield.
September 30, 1875	24,877	$910.798
December 31, 1875	13,963	561,419
March 31, 1876	9,630	370,073
June 30, 1876	7,857	355 324
Totals	56,327	$2,197,614

Average yield to the ton of ore about $39.

In commenting upon this table the Assessor remarks that it does not show the real condition of the mines and mining interests of Eureka County, as the mines have not been so energetically worked as formerly, for reasons before stated, and as a consequence the bullion shows a material reduction in comparison with other years. The mining outlook of the district never looked better. There are eighteen furnaces in the county, and three quartz mills with forty-five stamps.

THE PHILADELPHIA GAS APPROPRIATIONS FOR 1877.—At a meeting of the Common Council on the 12th inst., the first bill taken up was the ordinance to make an appropriation for lighting the city. The amount asked was $568 550 ; and the first item was $510.750 for furnishing gas to and lighting all night, extinguishing, cleansing and repairing 1,350 lamps, at $45 per lamp.

Mr. CAVEN moved to reduce the cost for each lamp to $30, and claimed that as the gas trust was a branch of the city government and showed a present surplus of $302-000 it was the very place where the pruning knife should be used. He stated that New Orleans paid $33.50 ; Boston, $30 ; Indianapolis, $28 ; New York, $38, and London, with 56,000 lamps, paid only $13.39. The trust had reduced the price of gas to outside consumers, and there was no reason it should not be reduced to the city.

Mr. MCMANES, one of the gas trustees, said that in New York they merely supplied the gas and nothing more. The surplus spoken of would be necessary to make permanent improvements, mains, etc.

Mr. BARDSLEY thought the price ($45) was a fair one, as he was opposed to making any more loans, and they should pay as they go.

Mr. CAVEN's motion was not agreed to.

Mr. CAVEN then moved to make the price per lamp $32.50 and $35 successively, both of which motions were voted down. He then moved to make it $40, and Mr. MCMANES said they would accept this amount, and it was agreed to.

THE MAGNOLIA TELLURIUM MINING DISTRICT.—There are now in this district nearly or quite 200 lodes, more or less, opened to a depth of from 10 to 220 feet. And it is a remarkable fact that every lode that has yet been opened to a depth of 50 feet except one, has developed tellurium mineral. I here give you a list of the most valuable mines thus far opened by shafts. The Mountain Lion, 215 feet deep ; this mine produces about 10 tons of ore per day. Keystone, 220 feet deep ; also a splendid mine. Dunraven, 80 feet deep, also a rich mine. Little Maud, 50 feet deep. Snow Flake, perhaps 35 feetd eep, owned in Georgetown, carries rich ore—calaverite. Mair Pointon, 80 feet deep, rich in chloride of mercury. Eagle Bird, perhaps 30 feet deep, with good ore. Sac & Fox, 85 feet deep bearing very rich petzite. Crœsus, a newly discovered miine, some 45 feet deep, bearing rich mineral. American Eagle, the southern extension of the Crœsus., also paying well. Kit Karson, 50 feet deep, bearing rich telluride of gold. Evening Star, just opened to a depth of 50 feet, bearing chloride of mercury, rich in gold. Lioness, not yet fully developed, but in a fine location. Downs, 45 feet deep. Morning Shade, Little Dorritt, Atlantic, Pacific, Inter Ocean, Congress, Thomas Jefferson, Crows Point, Matilda Jane, Butcher Boy, Poor Man's Cash. These and perhaps upwards of one hundred other mines or rather lodes, will develope into mines as rich as the Mountain Lion, or Keystone. All that is needed is to put them down, for they are all solid good tellurium veins. While I was in Magnolia I learned that the very dirt that covers the tellurium rock bears free gold, and this reddish yellow dirt is now being shipped to the reduction works, and runs some 2 ounces of free gold to the ton. This covering of the tellurium rock is from 12 to 20 feet thick, and covering an area of about 4,000 acres. We are now testing this upper stratum of earth.—Correspondence in Georgetown, Colorado, *Miner*, December 7th.

THE AMERICAN IRON SHIPPING TRADE.—We note with great pleasure the steady progress made in this important industry, and the high reputation which the vessels built by JOHN ROACH & SON, at Chester, Pa., have earned. The superiority of American over European iron has enabled this firm to compete successfully with English yards, and the quality of the work turned out has received universal commendation. The greatly reduced cost of iron in this country will undoubtedly contribute to the development of shipbuilding, and we trust that this enterprising firm will reap in the growth of their business, and profit the reward they have so well earned by the service they have done this branch of industry. For to Messrs. ROACH & SON is principally due the high reputation which American iron ships are now gaining.

"A new American steamship arrived in this port Wednesday from the yard of JOHN ROACH & SON, at Chester, Pa. The vessel is built of iron and named the *Rio Grande*, being intended for the Southern trade. The keel of this handsome craft, now the largest on the coast, was laid in the latter part of June and she was launched on the 21st of October, leaving Chester for this port on Tuesday. She is to leave to-day (Saturday) for Galveston, and is capable of carrying 6,000 bales of cotton. The following are the dimensions of the *Rio Grande*: Length, 308 feet over all ; 39 feet beam and 21 feet 9 inches depth of hold. Her displacement at 16 feet draft is 3,700 tons. She is schooner rigged, foremast 74 feet and mainmast 78 feet above deck. Her anchors are worked by steam power, as also her cargo winches. Her machinery consists of one pair of compound engines of 1,600 indicated horse power, with cylinders of 34 and 60 inches diameter and 54 inches stroke of piston. She has four cylindrical tubular boilers 12 feet diameter and 10 feet long. She has one smokestack. The propeller wheel is 14 feet in diameter, with a mean pitch of 22 feet, and it is claimed that she is capable of running fourteen knots an hour. The *Rio Grande* is built of the best American plate and angle iron. The main deck is of ¾-inch iron, and the lower deck is covered with iron over the engines of the same thickness. A curious feature of this vessel is the iron deckhouse, 81 feet long, 18 feet wide and 8 feet high, which encloses all the boilers and machinery. This house contains all the cooking arrangements, inflammable stores, etc. Another novel feature in this vessel is an immense tank placed in the stern for water ballast, capable of holding eighty tons of water, which will be used to sink her aft when required to give power to the working of the screw. The saloons, rooms and halls are furnished in amaranth bird's-eye maple, rosewood, satinwood, and no expense has been spared to make her equipment handsome and luxurious. Her cost was about $300,000. She is to be commanded by Captain JAMES BOLGER, long engaged in the New York and Galveston trade. She has been visited by a large number of shipping men, who greatly admired her."

A COMBINATION OF THE NEW YORK GAS COMPANIES to raise the rates for supplying the city lamps with gas for 1877, to an average of $36 per year, instead of about $23, as charged last year, has had the effect of causing the Board of Aldermen to take action in the premises. At a meeting of the Board on the 14th inst., the following resolution was adopted :

Whereas, It is apparent that the several gas-light companies in this city have entered into a combination or conspiracy by which the expense of lighting the city lamps will be largely increased over former years, and this, too, at a time of depression in all descriptions of business, a general shrinkage in all kinds of values, and a great reduction in the prices of coal and all other commodities that enter into the production of illuminating gas ; and

Whereas, It is adverse to the public interests to yield to the exactions of these gas companies, who are and should be under the control absolutely of the local authorities, in so far, at least, as relates to the cost of the gas used in lighting the streets, if not in respect to the gas consumed by private individuals ; and as it is beyond question that the power of the city authorities should be exercised to control these monopolies, or to provide in the same manner for furnishing light to our citizens as is now used for supplying water, be it therefore

Resolved, That the Mayor, Comptroller, and Commissioners of Public Works, who are now authorized to make arrangements with the gas companies of our city for lighting our streets, be and they are hereby respectfully required to take into consideration the propriety of inaugurating a system for the production and supply of illuminating gas for public and private purposes similar to that now in use for furnishing our citizens with water, and that in order to provide temporarily for lighting the streets, the city officers above named be and they are hereby requested to substitute oil or other illuminating material on the lamp-posts now erected on the Fifth avenue, from Washington square to Fifty-ninth street, as an experiment ; and, in order to test the practicability of lighting the streets in this city by other means than by the use of illuminating gas, the result of the proposed experiment, and the propriety of the manufacture of gas by the city, to be reported to this Board when deemed of public interest to do so.

The gas appropriation for the present year was $700,000. If these bids are accepted, the appropriation for 1877 must be increased to $831,000. The decision of the matter rests with the Mayor, Comptroller, and Commissioner of Public Works.

Cincinnati is now having a similar contest, but the law on its side is there more explicit. The statutes of Ohio allow the Common Council to fix the price of gas, with permission to the companies to appeal to the courts if the price is made too low. In 1867 the Cincinnati Gas Company appealed to the State Supreme Court, disputing the right of the Council to fix the price, and the court decided as follows :

"An ordinance of the City Council, duly passed pursuant to the power given by the act of March 11, 1853, and fixing the maximum price to be charged by defendant (the gas company) for gas for the period of one year from its date, is obligatory upon the defendant," etc. See Ohio State Reports ; Critchfield, volume 18, page 263.

The gas company kept up the fight for some time, but at length yielded to the law. We suggest to the companies in this city that it may be more profitable for them to charge just rates in the present circumstances than so to arouse public opinion that the Legislature shall be called on to apply an Ohio remedy.

STATISTICS OF COAL PRODUCTION.

This is the only Report published that gives full and accurate returns of the production of our Anthracite mines.

Comparative Statement for the week ending Dec. 9.

Tons of 2,240 lb.	1876. Week.	1876. Year.*	1875. Week.	1875. Year.*
Wyoming Region.				
D. and H. Canal Co.	35,663	1,897,806	55,992	2,893,480
D. L. and W. RR. Co.	62,648	1,848,004	50,171	2,842,680
Penn. Coal Co	24,263	1,036,214	23,724	1,293,588
L. V. RR. Co.	27,237	895,179	20,998	897,581
P. and N. Y. RR. Co.	1,157	24,384	950	86,571
C. RR. of N. J.	45,147	1,303,742	43,993	1,411,071
Penn. Canal	—	407,522	—	299,267
	196,115	7,412,851	195,828	9,722,238
Lehigh Region.				
L. V. RR. Co	67,057	2,683,751	83,619	2,130,099
C. RR. of N. J.	31,431	1,327,029	29,205	774,041
D. H. and W. B. RR.	451	39,981	782	68,698
	98,939	4,050,761	113,606	2,972,838
Schuylkill Region.				
P. and R. R. RR. Co.	100 126	4,696,931	93,834	4,633,408
Shamokin & Lykens Va.	21,432	912,013	20,721	1,171,996
	121,558	5,608,944	114,555	5,805,404
Sullivan Region.				
Sul. and Erie RR. Co.	138	30,189	657	12,515
Total	416,750	17,102,745	424,646	18,512,995
Increase	—	—	—	—
Decrease	8,896	1,410,250	—	—

* Year beginning January 1st.

The above table does not include the amount of coal consumed and sold at the mines, which is about five per cent. of the whole production.

The decrease of shipments of Cumberland Coal over the Cumberland Branch, and Cumberland and Piedmont Railroads amounts to 478,012 tons, as compared with the corresponding period in 1875.

Belvidere Delaware RR. report.	Week.	Year 1876.	Year 1875.
Receipts of coal at Coal Port (Trenton)	3,940	293,806	193,455
" " " South Amboy	16,376	428,182	266,727
Shipments at Coal Port (Trenton)	5,361	284,077	192,731
" South Amboy	11,534	474,512	326,956

Perth Amboy business:

	Tons.
Received for the week	30,676
Shipped for the week	21,968
On hand Dec. 9	68,975

Receipts of Coal at Boston, for the week ending Dec. 8, and years from Sept. 1, 1875 and 1876.

From	Week. Tons.	Previously. 1876. Tons.	1875. Tons.
Alexandria and Georgetown	4,573	11,987	42,871
Philadelphia	25,491	257,053	282,868
Baltimore	7,609	41,281	49,106
Other places	12,358	85,416	118,959
Great Britain	85	1,873	704
Nova Scotia	....	13 348	11,868

Coal Shipped at Pictou, N. S., for week ending Dec.

2 1876	1,862 tons.
Previously exported, since Jan. 1	169,325 "
Total to date	171,187

The Production of Bituminous Coal for the week ending Dec. 9, was as follows:

Tons of 2,000 lb., except where otherwise designated.

Cumberland Region, Md.	Week, Tons.	Year, Tons.
Tons of 2,240 lb	30,777	1,737,963
Barclay Region, Pa.		
Barclay RR., tons of 2240 lb	9 141	335,415
Broad Top Region, Pa.		
Huntingdon and Broad Top RR	3,705	151,419
*East Broad Top	903	61,918
Clearfield Region, Pa.		
*Snow Shoe	913	47,035
*Tyrone and Clearfield	25,940	1,033,579
Allegheny Region, Pa.		
*Pennsylvania RR	5,6 7	193,139
Pittsburgh Region, Pa.		
*West Penn. RR	4,213	184,733
*Southwest Penn. RR	1,019	52,607
*Penn. & Westmoreland gas coal, Pa. RR.	24,897	806,667
*Pennsylvania RR	5,045	278,341

* For the week ending Nov. 28.

The Production of Coke for the week ending Nov. 28.

Tons of 2000 lb.	Week.	Year.
West Penn. RR	2,972	49,522
Southwest Penn. RR	7,563	480,896
Penn. & Westmoreland Region, Penn. RR.	1,471	52,957
Pittsburgh, Penn. RR	3,735	145,090
Total	15,741	728,465

COAL TRADE REVIEW.

NEW YORK, FRIDAY EVENING, Dec. 15, 1876.

Anthracite.

There is no improvement observable in the demand for coal. Prices continue to be as low as they have been, and some who purchased coal at the last auction sales have been reselling at prices but very little above the lowest realized at the auctions. The very mild weather that has ruled for several days past is reducing the consumption of coal and must have a depressing effect on trade, while the severe weather which preceded it was not sufficient to reduce stocks with dealers so much as to compel them to enter the market. The production last week was 416,750 tons, a considerable reduction from the rate which ruled a month ago, and a slight reduction as compared with the corresponding week of 1875. The total decrease in production since Jan. 1st, as compared with the like period of last year, is 1,410,250 tons. The present out-put is still in excess of the requirements of the market, and stocks of coal are increasing.

The Pennsylvania Coal Company announces a sale at public auction, on the 20th inst., of 80,000 tons of coal. The Delaware, Lackawanna and Western Railroad Company will sell but 50,000 tons on the 21st inst. The total quantity to be sold, in this case, will not be so much as last month; but, from present indications, it looks as though there would be but a light demand from retail dealers and manufacturers, and that wholesale dealers will probably be the purchasers, and they will be compelled to buy at very low figures to net a profit on their purchases.

There have been sundry rumors during the week of the formation of a new combination. This is emphatically denied by gentlemen in position to know what is being done, and we fail to find the first indications of such a movement. If the several companies had decided that a combination of some sort would be advisable, they would even then be far from establishing one, as the details of the programme upon which to conduct the business would be as difficult of arrangement as under the old combination.

There have been rumors that the Philadelphia and Reading Railroad Company will ship coal from South Amboy, an arrangement being possible whereby the coal of that company can be delivered at New York at a much less cost than by their steam colliers, but such an arrangement has not been completed.

The Lehigh operators held a meeting in Philadelphia this week and appointed a committee to confer with the large companies relative to making a reduction of wages. A meeting for this purpose will take place in this city on the 20th inst.

Bituminous.

There is but little to observe in the way of business in this coal. Shipments being suspended by canal, the amount of Cumberland coal is very much reduced. Clearfield coal is not quite so active as it has been, yet there is a very fair business doing in it, with prospects of liberal trade throughout the winter.

During the late cold snap, about 10,000 tons of coal were frozen in on the Chesapeake and Ohio Canal. The canal company has determined to enable the boats to reach Georgetown and are using an ice breaker for that purpose.

The Baltimore and Ohio Railroad, since the close of the canal, has made a move to reduce its coal business, instead of increasing it, as it should, now that competition has ceased for the winter. It has issued notice that the drawbacks which have been given shippers will be discontinued. This notice has not been issued to all, but will, no doubt. This movement must be due to the anticipation of a strike among the men against the proposed reduction of wages, which would induce the companies to stock coal at Baltimore to meet their wants during the continuance of the strike. The railroad company therefore proposes to take advantage of the situation and squeeze an additional rate out of the coal companies. This has, we believe, always been the policy adopted by this road towards all interests dependent on it exclusively for transportation.

At last the Consolidation Coal Company is driven to fall into that inevitable line of action which we have from time to time pointed out. It now heads a movement to reduce wages from 65c. per ton for mining coal to 40c. per ton, and other labor upon the same basis, the reduction to take effect January 1st. This is a very necessary move, and the reduction of freights on the line of its road must be only a matter of time.

We are pleased to learn that there is an escape for the shippers of coal on the Chesapeake and Ohio Railroad from the rates we announced in our issue of the 2d inst., although it may be an arbitrary one. The general coal agency of the road is offering all the coals sold at Richmond, and those companies who adopt this means of disposing of their coal will find a market for it, as it is the determination of the agency to meet all other coals in price. This it is enabled to do by having an arrangement with the railroad by which the freight is based upon the price received for the coal.

Retail Prices in New York.

Anthracite.

Per 2000 lb.	Grate and Egg.	Stove.	Chestnut.
Pittston coal, in yard	$3 90	$4 20	$3 90
Lackawanna coal, in yard	3 90	4 20	3 90
Wilkes-Barre, delivered	5 00	5 30	5 00
Lehigh & Locust Mountain, del'd	5 50	5 50	5 00
Schuylkill Red Ash, del'd	5 25	5 50	4 75

The Cost of delivery for Pittston and Lackawanna coal ranges from 40 cts. to $1 10 per ton, according to distance from the yard.

Bituminous.

Liverpool House Orrel, delivered, per ton of 2000 lb	$18 00
Liverpool House Cannel " " "	18 00
American " " "	11 00
Cannelton Block, or splint, " " "	10 00
American Orrel " " "	11@14
Red Bank Cannel " " "	10 00
Cumberland " " "	7 00

New York and Philadelphia.

Wholesale Prices of Anthracite Coal f.o.b. at the Tide Water Shipping Ports per ton of 2240 lb.

	Lump.	Steamer.	Grate.	Egg.	Stove.	Chestnut.
Wyoming Coals.						
‡Lackawanna and Scranton at Hoboken and Rondout	3 00	3 00	3 00	3 00	3 75	3 75
Pittston at Weehawken	3 00	3 00	3 00	3 10	3 60	3 35
Wilkesbarre at Port Johnston	3 00	3 00	3 00	3 00	3 75	3 25
Plymouth, R. A.	....	....	3 00	3 00	3 85	3 35
Susque. Coal Co. at Amboy W.A.	3 00	3 00	3 00	3 00	3 75	3 25
Kingston at Hoboken	3 00	3 00	3 00	3 00	3 75	3 25
Lehigh Coals.						
Old Company at Port Johnston	3 75	....	3 25	3 25	3 75	3 25
Old Company's Room Run "	3 75	....	3 25	3 25	3 75	3 25
Sugar Loaf, Hobok. & Amb. "	3 75	....	3 25	3 25	3 75	3 50
Lehigh Coal Exchange "	3 75	....	3 25	3 25	3 75	3 50
Honey Brook Lehigh	2 75	....	3 25	3 25	3 75	3 25
Beaver Meadow at South Amboy	3 75	....	3 25	3 25	3 75	3 25
Schuylkill Coals at Philadelphia.						
Schuylkill white ash	....	....	....	....	....	....
Schuylkill red ash	....	....	....	....	....	....
Lorberry	....	....	....	....	....	....
Lykens Valley	....	....	....	....	....	....
North Franklin red ash	....	....	....	....	....	....

‡ Boats towed by the D. & H. C. Co. at its expense to and from New York harbor.

	Per ton.
Freight from Hoboken and Weehawken to New York	35c.
" " Elizabethport & Port Johnston to N. York.	35c.
" " South Amboy to New York	35c.

Freight by the boats of the companies from Hoboken, Port Johnston, Weehawken, Rondout, South Amboy and Perth Amboy to New York City and vicinity 50c.

Lackawanna coal delivered to carts in New York or Brooklyn, 50 cents per ton additional.

Wholesale Prices of Bituminous Coal.

Domestic Gas Coals.

Per ton of 2240 lb.	At the Shipping Ports.	Alongside in New York.
Westmoreland and Penn. at Greenwich, Philadelphia	$4 70	$6 00
" " at S. Amboy	5 50	6 00
Red Bank Cannel Pa. at Philadelphia	8 00	8 50
Youghiogheny, Waverly Co., at Balt.	4 25	5 65
Despard, West Va.	4 50	6 00
Murphy Run, West Va., at Baltimore	4 50	5 85
Fairmount, West Va., " "	4 40	5 70
Newburgh Orrel, Md. " "	4 50	6 00
Cannelton Cannel, W. Va.	....	10 00
" Splint, " at Richmond.	6 00	7 0
" Gas Coal at Richmond	4 15	5 65
Peytona Cannel W. Va at Richmond	....	10 00

Manufacturing and Steam Coals.

Cumberland at Georgetown and Alexandria, Va	3 50@3 75	5 20
Cumberland, at Baltimore	3 65@3 80	5 45
Clearfield f.o.b. Canton, Baltimore	3 40@3 65	5 25

Pennsylvania Semi-Bituminous Coals.

At the mines, per 2,000 lb., 90c. f.o.b. at Greenwich, Phila., for Eastern and Foreign shipments, per 2,240 lb. $3 25@3 40 for Sound ports, 3 50@3 65, f.o.b., at South Amboy, N. J., per 2,240 lb., $4 5c@4 70. Discharged, in New York, per 2,240 lb., $5 00 @5 25.

Foreign Gas Coals.

	Sterling.	Am. currency.
Newcastle, at Newcastle-on-Tyne	9/6@11/	6 50@ 7 00
Liverpool House Orrel, at Liverpool	26/	13 00
Ince Hall Cannel "	42/	18 00
" Gas Cannel "	28/	13@14
Scotch Gas Cannel, at Glasgow, nominal,	25/	7 50
	Gold.	
Block House, at Cow Bay, N. S	2 00	4 75
Caledonia, at Port Caledonia	1 50	4 25
Glace Bay, at Glace Bay	1 50	4 25
Lingan, at Lingan Bay	1 75	....
Sydney, International and Reserve mines, at Sydney	2 00	5 50
Pictou, Albion & Vale mines, at Pictou.	2 25	5 75

Baltimore, Md. Dec. 13, 1876.

Specially Reported by Messrs. E. STABLER & Co.

ANTHRACITE.

Wholesale or Trade Prices per 2240 lb.

Wilkes-Barre "Boston" Vein, and Plymouth White Ash.

In cars at depot.		In cars at depot.	
Lump	$3 85	Egg	$4 10
Steamboat	4 10	Stove	4 60
Broken	4 10	Nut	4 10

Shamokin, red or white ash.

Egg	4 30	Stove	4 60

Lykens Valley, red ash,

Egg and stove	5 35

From wharf or yard, wholesale, 50@75c. additional.

By retail, all kinds and sizes, per 2240 lb. $6 00@7 50

BITUMINOUS.

George's Creek, Cumberland f. o. b. at Locust Point	3 75@4 00
West Virginia Gas f. o. b. at Locust Point	4 50
Youghiogheny Gas, f. o. b. at Locust Point	4 50
Swanton	4 00

Boston, Mass. Dec. 9, 1876.

COAL is weak, and for some descriptions lower. There are few orders at any of the shipping ports, and small vessels are getting scarce, leaving the freight market about evenly balanced. We quote $1.75@1.80 from Philadelphia, $1.40@1.45 from New York, $2 from Georgetown, $2 from Baltimore, and $2.34 from Richmond. These are the same prices as a week ago. The local supply of coal is not large, spite of heavy arrivals during the past three weeks, and might become positively short should the winter prove particularly severe.—*Commercial Bulletin.*

Buffalo, N. Y. Dec. 13, 1876.

Specially Reported by Messrs. LEE & LOOMIS.

Connellsville coke, gas, steam and cannel coals are offerred, for the present, subject to our printed conditions, at the following prices per ton of 2,000 lb., delivered on cars here.

	Lump.	Run of Mine.	Nut.	Slack.
Connellsville Coke	$5 00	....	....	....
Brookfield Coal	4 15	....	2 85	....
Briar Hill	4 15	....	2 85	....
Youghiogheny	4 25	....	....	....
Monterey	3 35	3 15	....	..
Catfish	3 35	3 15	....	....
Stoneboro	...	....	2 65	2 25
Sterling Cannel	5 00	4 75	4 50	....
Reynoldsville	3 50	...	....	....
Cameron	....	3 00	....	2 25
Buffalo Coal Co.	....	3 00	....	2 25

Chicago, Ill. Dec. 11, 1876.

Specially reported by Messrs. RENO & LITTLE.

Lackawanna Stove	$8 00	Erie and Brier Hill	$6 00
" Chestnut	7 75	Wilmington & Ill.	3 50@ 4 25
" Grate & Egg	7 50	Blossburgh	7 00

Cincinnati, O. Dec. 11, 1876.

Specially Reported by Messrs. A. BUCHANAN & Co.

	Bush.	Ton.
Per ton of 2000 lb.		
Youghiogheny, or Pittsburgh, afloat	@7c.	—
Pomeroy coal "	@5c.	—
Kanawha " "	7½c.	—
Ohio River Coal "	5½c.	—
Cannel coal, according to quality "	@16c.	—
The following are the retail prices delivered		
Youghiogheny	10@11c.	—
Pomeroy	9c.	—
Cannel	@22c.	—
Kanawha	10c.	—
Anthracite, per ton	$9 00@9 50	—
Coke, at yard	10c.	—
Coke, hard and soft, delivered	— @9c.	—

Cleveland, O. Dec. 11, 1876.

Specially reported by Messrs. LAMBIE & BATES.

The following are the prices established by the Coal Exchange until further notice:

Per ton of 2000 lb. f. o. b. vessels.

WHOLESALE.

	1 to 10 tons.	10 tons upw'd.
Brier Hill lump	$4 25	$4 00
" " nut	3 75	3 50
Massillon and Mineral Ridge lump	4 00	3 75
" " " " nut	3 75	3 50
Straitsville Lower Vein, Hocking & Shawnee, l'p.	3 60	3 35
" " " " nut	3 40	3 15
Del Carbo lump	3 75	3 50
" " nut	3 50	3 25
Rich Hill lump	3 50	3 35
" " nut	3 25	3 00
Columbiana, lump	3 25	3 00
" nut	2 75	2 50
Lacka'a., Wilkesbarre and Pittston egg and grate,	7 00	6 75
" " " stove	7 50	7 25
" " chestnut	7 25	7 00

Lehigh to be $1 25 per ton higher.

All sales to be strictly cash with order or C. O. D.

Indianapolis, Ind. Dec. 11, 1876.

Specially reported by Messrs. COBB & BRANHAM.

Wholesale on board cars, and retail delivered to consumers.

Per ton of 2000 lb., bushel of 70 lb.

BITUMINOUS.

White River, per ton	$2 50	Peytona cannel, per ton.	5 75
Brazil Block, "	2 50	Indiana Cannel	4 50
Highland, grate, "	2 25	Hocking Valley	4 25
Block coal, nut, per car	18 00	Youghiogheny	4 50
Highland " "	18 00	Blossburg (smithing)	6 50
Block Slack " "	17 00	Piedmont "	6 50
		Gas coke, per bushel	10

ANTHRACITE (Lackawanna and Wilkes-Barre.)

Broken	$8 35	Nut	8 50
Egg	8 35	Stove	8 75

Lehigh Anthracite.

Broken	9 75	Nut	9 50
Egg	9 75	Stove	10 00

Retail, per bushel, delivered.

Sand Creek	15c.	Block Nut, steam	8
White River	13	" Slack, "	7
Brazil Block	14	Peytona Cannel	28
Highland grate	13	Virginia "	27
Block Nut, domestic use	12	Youghiogheny	20
Highland Nut, " "	12	Blossburg	26
" " steam	8	Piedmont	26

GAS COKE (measured.)

Crushed	15c.	Lump	12c.

ANTHRACITE.

Wilkes-Barre and Lackawanna (all sizes)	$9 75 per ton.
Lehigh, retail	$11 50 per ton

Louisville, Ky. Dec. 11, 1876.

Specially reported by Messrs. BYRNE & SPEED.

Four months allowed on quotations below.

WHOLESALE.

	per bushel		per bushel
Pittsburg	6½c.	Pine Hill	—
Raymond City	6½c.	Kentucky	7c.

RETAIL.

	per bushel		per bushel
Pittsburgh	10c.	Peytona Cannel	18c.
Raymond City	10c.	Buckeye "	
Pine Hill	13c.	City-made Coke	8c.
Kentucky	9c.	Anth., per ton, $10 00 to 10 50	
Screened Pittsburgh per load		$3 50	
Screened Raymond City		2 50	
Pine Hill (Kentucky)		2 25	
Cannel		4 50	
City-made Coke		4 00	

Milwaukee, Wis. Dec. 11, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Retail price per ton of 2000 lb.

Lehigh Lump	$ 8 00	Briar Hill, select	$7 00
Lehigh Prepared	9 00	Blossburgh	7 00
Lackawanna (all sizes)	8 00	Cannel	6 00
Pittston	8 00	Pittsburgh	6 50
Scranton	8 00	Oak Hill	6 00
		Steam coal	5 00

New Orleans, La. Dec. 10, 1876.

Specially Reported by Messrs. C. A. MILTENBERGER & Co.

Pittsburg coal, wholesale, by boat-load, per bbl	30c.
" steamboats, per bbl	40c.
" to manufacturers, per bbl	45c.
" to families	50c.
" shipments, per hhd	$5 00
Anthracite, wholesale, per ton	7.50
" retail, "	11.00
Virginia Cannel, retail, per bbl	1.00
Scotch " "	
Mt. Carbon, wholesale, per bbl	
" " retail, "	
St. Bernard wholesale, per bbl	25c.
" steamboat	37c.
" retail, "	4 @45c.

Pittston, Pa. Dec. 12, 1876.

Pennsylvania Coal Company's Coal in yard, ton of 2000 lb.

Retail.

Lump, Egg and Stove	$2 25
Chestnut	2 00
Pea	1 00

Delivered, fifty cents per ton additional.

Philadelphia, Pa. Dec. 14, 1876.

From our Special Correspondent.

Trade is dull, the weather is mild, and the ice in the harbor still interfering badly with shipments, though disappearing very fast to-day. Much of the time of coal men is devoted now to suppositions for next year's programme, also the probability of a combination, and the advisability of a stoppage, all of which have taken no practicable shape yet, and in the opinion of many are not likely to do so. If rumor is to be believed, the tendency seems to be the other way, preparations being made and arrangements concluded for taking coal from here over the Camden and Amboy Railroad, to South Amboy, to be sent from there to New York, and shipped East. The Reading Coal and Iron Company, for whose benefit alone this arrangement is reported to have been made, is to begin next week to send several trains daily to that terminus.

Vessels are reported loading at $2.25 and $2.50 to Boston.

Richmond, Va. Dec. 12, 1876.

Specially reported by S. H. HAWES, Dealer in Coal.

Per ton of 2240 lb., f.o.b.

Kanawha Cannel	$9 00	New River Bituminous,	$4 40
Coalburgh Splint	5 70	Clover Hill Coal	3 50
Lewiston "	5 70	James River Bitum	3 30
Kanawha Gas coal	4 90	" " Carbonite,	5 00

San Francisco, Cal.

From the *Commercial Herald*, Dec. 7, 1876.

Imports from Jan. 1st to Dec. 1st:

	tons.		tons.
Anthracite	10,950	Vancouver Island	87,149
Australian	124,163	Rocky Mountain	163
Coos Bay	35,050	Seattle	81,609
Cumberland	12,421	Bellingham Bay	19,635
English	97,099	Chili	3 150
Mt. Diablo 10 mos	101,733		

The market continues to be flooded with Scotch and English Steam, cargo sales of which have been made to some extent during the week at $7. The Pacific Coast supply is liberal, yet not to the extent of past seasons, by reason of the extremely low prices ruling for imports of both anthracite and bituminous. We submit the following as the approximate spot price of Cumberland ex ship, $14@$15 in bulk, $17 in casks; Lehigh, $13.50@$15; Pittson, $14@$14.50 for egg; Sydney Steam, $7.50; Wallsend, $8@$8.25; West Hartley, $8.50@$9; Mount Diablo, fine, $5.75, coarse $7.75; Coos Bay, $9; Seattle, $9; Bellingham Bay, $8.

St. Louis, Mo. Dec. 11, 1876.

Reported by JAS. J. SYLVESTER, Secretary of the Anthracite Coal Association.

Retail prices, delivered. Ton of 2,000 lb.

ANTHRACITE.

	per ton.		per ton.
Lackawanna	$9 00@10 00	Schuylkill	9 00@10 00
Wilkes-Barre	9 00@10 00	Lehigh	10 00@10 50

BITUMINOUS.

Blossburg	9 00	Big Meadow	3 00
Pittsburg	4 50	Illinois Coals	2 50@3 00
Indiana Block	4 00	Connellsville Coke	8 50

Toledo, Ohio. Dec. 11, 1876.

Specially reported by Messrs. GOSLINE & BARBOUR.

We quote as follows for retail delivery:

Ton of 2,000 lb.

Lackawanna lump	$6 75	Lehigh lump	$7 75
" egg	6 75	" egg	7 75
" stove	7 00	" stove	8 00
" chestnut	6 75	" chestnut	7 75

Soft Coal.

Hocking lump	4 00	Brier Hill	5 75
" nut	4 00	Blossburg	8 00
Willow Bank lump	4 50	Cumberland	8 00
" " nut	4 00		

Hamilton, Ont. Dec. 11, 1876.

Specially reported by H. BARNARD, Dealer in Coal.

Retail, per ton of 2,000 lb.

Grate	$5 75	Smithing	6 00
Egg	5 75	Bituminous retail	5 50
Stove	6 00	" steam	4 00
Nut	5 75	Coke	6 75
Lehigh Lump	6 50		

Montreal, Canada. Dec. 12, 1876.

Specially reported by Messrs. ROBERT C. ADAMS & Co.

The close of navigation finds the city well supplied with all descriptions of coal, and prices are likely to be moderate all through the winter. Some of the last cargoes of anthracite are selling at low prices from the wharf, but the winter rates will be obtained for coal exyard after this week. Quotations: Scotch Steam, $5.25; Pictou, do., $5; Cape Breton, $4.50; Newcastle Smiths, $6.50. Anthracite: Egg, $6.50; Chestnut, $6.75; Stove, $7.

Wholesale per ton of 2240 lb.

Scotch Steam	$5 25	Cape Breton Steam	$4 50
Pictou "	5 00	Newcastle Smiths,	6 50

Anthracite at retail, per 2000 lb., delivered.

Egg	$6 50	Chestnut	6 75
Stove	7 00		

Rates of Transportation on Anthracite Coal to Tide Ports.

We refer to our issue of Dec. 9th for these freights.

Freights

Representing the latest actual charters up to Dec. 15, 1876.

Per Ton of 2240 lb.

PORTS.	From Philadelphia.	From Baltimore.	From Georgetown.	From Elizabethport, Port Johnson, South Amboy, Hoboken and Weehawken.
Augusta, Me	....	....	....	....
Albany	....	....	....	....
Alexandria	....	....	....	....
Amesbury, Mass	....	....	....	1 75
Bangor, Me	....	....	....	1 50
Bath, Me	....	....	....	1 50
Baltimore	....	....	....	....
Boston, Mass	1 75	2 00	....	1 40@60
Bridgeport, Ct	1 40@1 50	1 75	....	60
Bristol, R. I	1 50	....	....	1 00
Cambridgeport, Mass.	1 80	....	....	1 40
Derby	....	....	....	....
Dighton	....	....	....	....
East Cambridge	1 80	....	....	1 40
Fall River	1 45@1 50	1 75	....	1 60
Hackensack	....	....	....	....
Hallowell, Me	....	....	....	....
Hartford	....	....	....	1 35
Hoboken	....	....	....	35
Hudson	....	....	....	....
Jersey City	....	....	....	35
Lynn, Mass	....	....	....	†1 40
Middletown	....	....	....	....
Mystic	....	....	....	....
Newark	....	1 50	....	....
New Bedford	1 60	1 80	....	1 60
Newburyport	1 75	2 20	....	1 50
New Haven	1 40@1 50	1 75	....	60
New London	1 45	1 75	....	80
Newport	1 45	....	....	1 00
New York	....	1 50	....	35
Norfolk	75	...	....	75
Norwalk	1 40@1 50	1 75	....	80
Norwich	1 60	1 85	....	90
Pawtucket	1 75	....	....	†1 60
Philadelphia	....	1 00	....	....
Portland	1 80	1 80	....	1 25
Portsmouth, N. H.	1 75@1 80	2 25	....	1 50
Providence	1 45	1 75	....	1 00
Poughkeepsie, N. Y.	....	....	....	....
Rockport	....	....	....	....
Saco	....	....	....	....
Sag Harbor	....	....	....	....
Salem, Mass	1 85	2 25	....	1 40
Salisbury Pt., Mass.	....	....	....	....
Stamford	....	....	....	....
Stonington	....	....	....	....
Taunton	....	....	....	....
Troy	....	....	....	....
Warren, R. I	....	....	....	1 00
Wareham	....	....	....	....
Washington	....	....	....	....
Weymouth	....	....	....	....
Wilmington, Del	....	1 00	....	....

* And discharging and towing. † And discharging. ‡ And towing. § 3c. per bridge extra.

IRON MARKET REVIEW.

New York.

FRIDAY EVENING, Dec. 15, 1876.

American Pig.—There is no business of any importance doing. It is reported that good brands of No. 1 foundry have been sold at $20 and $20.50, and although we are not able to confirm this, yet it is not discredited. There is certainly no quantity of iron worthy of note, if any at all, moving at more than $21. We quote No. 1 foundry at $21; No. 2 and forge at $19@$20.

Scotch Pig.—This article is as quiet as American pig, and is weaker both here and abroad. We quote No. 1 iron as follows: Coltness, $29; Eglinton, $26; and Glengarnock, $28.

Rails.—We are only reported a sale of 300 tons of steel rails on private terms. The effort to form a combination among the manufacturers of steel shows indications of being a failure. We quote iron rails at mills at $35@$40, and steel at $48@$54.

Old Rails.—In the absence of business, these are nominally quoted at $20.

Scrap.—Wrought is without business, and nominally quoted at $26.

Baltimore, Md. Dec. 13, 1876.

Specially reported by Messrs R. C. HOFFMAN & Co.

With a limited demand, pig iron, in small lots, is selling at about quotations:

Baltimore Charcoal	$20@32	Anthracite No. 1	$19@20 00
Virginia Charcoal	20@31	Mottled and White	17@18 50
Anthracite No. 1	22@24	Charcoal Blooms	60@65 50
" No. 2	20@22	Refined Blooms	50@55 00

Boston, Mass. Dec. 9, 1876.

PIG is apathetic, with open talk of cash sales at $1 a ton under the prices of a week ago. The feeling is feverish, with the outlook certainly very unsatisfactory. Sales of 2X Thomas Company have been made in New York at $20. The Thomas Company have sold up all their No. 1 iron, and have but little No. 2, and have sold enough ahead to keep their works in active operation up to about the first of February. We quote all the way from $19 to $24, the inside figure for gray forge. Scotch pig is not inquired for and is nominal, quoting Gartsherrie $31 and $29, both currency.

BAR is weak, in sympathy with pig. The supply now comes from the West more than ever. The Bay State is not doing anything, and the same may be said of the majority of New England rolling mills. We quote $48 for refined and $39 for common.—*Commercial Bulletin.*

Chattanooga, Tenn. Dec. 12, 1876.

Specially reported by J. F. JAMES. pig iron broker, etc., 233 Market Street.

There has been no improvement in the condition of our market since last report. Sales are light and no improvement in the trade is looked for till after the holidays.

We quote on the usual four months' time.

Tenn. Ala. and Ga. Charcoal, No. 1 foundry	$20@ 21
" " " " No. 2 foundry	19@ 20
" " " " gray forge	16@ 17
" " and Georgia coke, No. 1 foundry	18@ 19
" " " " No. 2 foundry	17@ 18
" " " " gray forge	15@ 16
White and Mottled	14@ 15
Tennessee and Georgia cold-blast car wheel	21@ 22
Alabama " "	21@ 22
Old Rails	cash 20 50
Cast Scrap	" 13
Wrought Scrap	" 18@ —

Cincinnati, Ohio. Dec. 12, 1876.

Specially reported by Messrs. TRABER & AUBERY, commission merchants for the sale of pig iron, blooms, ore, etc.

Our market is extremely quiet, and there is no change in prices. We quote:

CHARCOAL.

Hanging Rock, No. 1 Foundry	$24 00@25 00	4 mos
" No 2, "	23 00@	4 mos
" Mill	21 00@	4 mos
Tennessee, No. 1, Foundry	23 00@	4 mos
Tennessee, No. 2, "	22 00@	4 mos
" Mill	21 00@	4 mos
Missouri, No. 1, Foundry	@	4 mos

STONE COAL.

Ohio, No. 1, Foundry	22 50@	4 mos
" No. 2, "	20 50@21 00	4 mos
Ohio Mill	20 00@21 00	4 mos
Missouri, No. 1 Foundry	25 00@	4 mos
" No. 2, "	24 00@	4 mos
" Mill	23 00@	4 mos

CAR-WHEEL.

Hanging Rock, C. B	40 00@45 00	4 mos
Tennessee "	25 00@32 00	4 mos
Missouri "	30 00@33 00	4 mos
Alabama "	25 00@32 00	4 mos

BLOOMS.

Charcoal	62 00@ 70 00	cash

SCRAP IRON.

Cast	50c.@ 85	cash
Wrought	1 00@1 40	cash

Cleveland, Ohio. Dec. 12, 1876.

Specially reported by Messrs. C. E. BINGHAM & Co.

Per gross ton, on four months' time. Subject to change in market. Discount for cash 4 per cent.

FOUNDRY IRON.

No. 1, Lake Superior Charcoal	26 50@
No. 2, " "	26 00@
No. 1. Anthracite	24 50@
No 2, "	22 50@
No. 1, Bituminous	24 50@
No. 2, "	22 50@
American Scotch, No. 1, Cherry Valley	@
" " B—1, " "	@
" " No. 2, " "	@
No. 1, Massillon	24 50@
B—1, "	23 00@
No. 2, "	21 00@

CAR WHEEL AND MALLEABLE IRON.

No. 3 Lake Superior Charcoal	26 50@
No. 4 " "	27 00@
Nos. 5 and 6 "	27 00@

BESSEMER IRON.

Nos. 1 and 2 Lake Superior Charcoal	26 50@

FORGE IRON.

No. 1, Gray	22 00@
White and Mottled	24 00@

Louisville, Ky. Dec. 13, 1876.

Specially reported by Messrs. GEORGE H. HULL & Co.

No change since last report. General complaint has been heard for the past week, in all branches of trade, of suffering in consequence of political uncertainties. The pig iron market has been unusually dull, but in view of the temporary causes, prices remain same as last quoted.

The usual time, 4 months, allowed on quotations below.

HOT BLAST—CHARCOAL.

No. 1 Foundry, from Hanging Rock Ores	$24 00@25 00
No. 2 " " "	22 00@23 00
No. 1, Mill, from " "	20 00@21 00
No. 1, Foundry, from Alabama, Georgia and Tennessee ores	22 00@23 00
No. 2, Foundry, from Ala., Geor'a and Tenn. ores	21 00@22 00
No. 1, Mill, from " " " " "	20 00@21 00

HOT BLAST—STONE COAL AND COKE.

No. 1, Foundry, from Hanging Rock Ores	22 00@23 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	20 00@21 00
No. 1, Foundry, from Ala. Ga. and Tenn. Ores.	21 00@22 00
No. 2, " " " " "	20 00@21 00
No. 1, Mill, " " " "	20 00@21 00
No. 1 Foundry, from Missouri Ores	— @ —
No. 2 " " " "	— @ —
No. 1 Mill, from Missouri Ores	23 00@25 00

COLD BLAST—CHARCOAL.

Car Wheel from Hanging Rock Ores	35 00@43 00
" " Tennessee "	26 00@28 00
" " Alabama and Georgia Ores	28 00@40 00
" " Kentucky Ores	28 00@42 00

Milwaukee, Wis. Dec. 12, 1876.

Specially reported by Messrs. R. P. ELMORE & Co.

Iron trade but medium; sales a little improved.

Lake Superior No. 1 Charcoal	$26 00
" " " 2 "	25 50
Lake Superior No. 1 Anthracite	25 50
" " " 2 "	24 00

Philadelphia, Pa.

(Weekly report of the Philadelphia Iron Market, furnished by Messrs. JUSTICE, COX, Jr., & Co., Iron Merchants, 333 Walnut Street, Philadelphia. Week ending Dec. 14, 1876.)

The transactions in iron during the past week have been, in a limited way, to supply immediate requirements. The fact of the end of the year being so near at hand, makes buyers exceedingly careful in their purchases, as all want their iron piles low at stock-taking time. The market is weak, with some iron accumulating on the furnace banks. We quote: No. 1, $21@$22; No. 2, $19.50@$20; Forge, $18@$19.50.

MANUFACTURED IRON.—Probably never in the history of the trade was this branch of the business in so unsatisfactory a state as at present. The mills that are running seem to pursue the policy to make no money themselves, or allow any one else to make it, hence prices are cut so low that profits are out of the question, and often cost is not obtained in the determination to obtain orders. We quote a dull market, with bars at 2 1-10c.@2 3-10c. per lb.; tank, 2⅞c.@7c.; skelp, 2¼c.@2½c. per lb.

RAILS.—We have nothing new to report in either steel or iron rails. Steel, $50@$52 at mill; iron, $38@$40.

OLD RAILS are a little more active, and are quoted $21@$22.

SCRAP.—Cast is quoted at $14@$19; wrought, $@24 $27.

Pittsburg, Pa. Dec. 15, 1876.

Specially reported by A. H. CHILDS.

No. 1 Foundry	24 00@25	4 mos
" 2 "	22 00@23	"
Gray Forge	20 00@22	"
White and Mottled	17 50@19	"
Warm blast Charcoal	23 00@28	"
Cold blast Charcoal Western	40 00@45	"

Richmond, Va. Dec. 11, 1876.

Specially reported by ASA SNYDER, Esq.

The iron market continues depressed. This, usually the dullest month of the year, has been made extraordinarily dull by the political suspense now prevailing. The market is weaker, although makers show no inclination to abate the price. Sales of about 200 tons charcoal iron since our last report, at a concession from the figures in last quotations, but none is now offering under the quotations last furnished.

Virginia Cold Blast Charcoal Pig Iron	$27	to $33
" Warm " " "	24	to 28
" " " Coke " "	23	to 24
" " " " "	2 X 21	to 22
" " " " "	3 20	to 21
" Anthracite 1 X	—	to —
" " 2 X	—	to —
" " 3	—	to —

San Francisco, Cal.

From the *Commercial Herald*, Dec. 7, 1876.

Imports are large both of tin plates, pig iron, etc. The market is slack, and prices both low and nominal. We are glad to see that the old and favorably known pioneer firm of THOMAS H. SELBY & Co. is to be continued, Mrs. SELBY having contributed $50,000 in gold coin as a special partner, the general business partners being active young men, long employed by the old house and every way familiar with the business, besides having the entire confidence of the commercial community. For more than twenty-six years the house of THOMAS H. SELBY & Co. has been a tower of strength in our city, ever maintaining an unsullied reputation for honor and probity, and we trust it may so continue for another quarter of a century. The *Colima* via Panama carried to New York 59,364 lbs. pig lead.

St. Louis, Mo. Dec. 12, 1876.

Specially reported by Messrs. SPOONER & COLLINS, Commission Agents for all kinds of Iron.

Market quiet. Prices firm at quotations. Prospects good for 1877.

CHARCOAL.

Missouri No. 1 Found'y.	$23@25
" " 2 "	22@23
" Gray Mill	22@23
H. Rock No. 1 Found'y.	25@26
" " 2 "	23½@24
" " Gray Mill	23@24
Tenn. No. 1 Foundry	23½@24
" 2 "	22½@23
" Gray Mill	22½@23

COKE.

Alice H. R. Ex No 1 F'y.	26 00
" " 1 "	25 00
B, " 1 "	24 50
" 2 "	23 50
Forge	23 50
Chat., Tenn. No. 1 Fd'y.	25 00
" " " 2 "	23 50
" " Forge	22 50
" " White Mtl'd	21 00

STONE COAL.

Missouri No. 1 Fd'ry.	25@26
" " 2 "	23@24
" Gray Mill	22@23
" White & Mt'd	21@22

COLD BLAST CHARCOAL FOR CAR WHEELS.

All Numbers.

Hanging Rock	35@46
Tennessee	30@33
Kentucky	30@33
Missouri	28@30
Georgia	28@30
Alabama	28@30
Assorted Bar Iron $2 25, rates.	
No. 1 Wrought Scrap 95c. cwt.	
Heavy cast " 70 "	
Light " " 40 "	

Montreal, Canada. Dec. 6, 1876.

We quote: Pig Iron. Eglinton and Clyde; $19.50@20.00; Summerlee $20.50@21.00; Langloan & Gartsherrie $22.50@23; Calder $21.50@22.50; Hematite $26.@27 Bar, per 100 lbs., Scotch and Staffordshire $2.@2.05 best do., $2.25@2.35, Swedes and Norway $4.75@$5 Lowmoor and Bowling, $6.@6.50.—*Monetary Times.*

METALS.

NEW YORK, FRIDAY EVENING, Dec. 15, 1876.

The stagnation which we have noticed for several weeks is slightly intensified this week, and there are no indications that an improvement can take place until after the close of the year, and when manufacturerers have taken account of stock and closed their books, and know where they stand.

Gold Coin.—During the week under review gold has ranged from 107 to 107¾, and closed at 107¾.

Bullion.—There has been a very decided advance in the quotations for silver, although the highest prices were reached yesterday, when the London price was 58¼d., and the rate here 1·25@1·26. The price in this market advanced 6c. per oz. in about 6 days time. The quotations to-day are lower and as follows: London 58d.; New York, 123@124; and San Francisco, 8 per cent. discount. The great advance that has been going on is said to have been caused by large purchases on account of the United States and the East Indies. One theory is that the Bonanza mines sought to force the Director of the mint, who has been West for the past month for the purpose of buying ten or twenty millions of silver which he needs for subsidiary silver coins, at an extortionate price, and that he declined and has bought largely in Europe. The price now, however, is too high, as he cannot coin and make the usual seignorage, and if this theory is correct, and he has withdrawn from the market abroad, the price must fall off, unless the India demand is heavy.

Copper.—We note sales of 100,000 lb. at 19¾c. There is nothing doing now; 19½c. is bid,, and 19¾c. asked. On the 9th inst., Best Selected was quoted in London at £84, and Chili Bars, £76.

Tin.—Straits is quoted in London at £88 10/. There is nothing doing in this market. The nominal quotations in gold are: Straits, 17⅝@17¾c.; L. & F., 17⅝c.; Refined, 17⅝c.; and Banca, 19¾c.

Tin Plates are quiet and quoted, per box, in gold, as follows: Charcoal tins, $6.75@$7, and ternes, $6@$6.50; coke tins, $6, and ternes, $5 50@5.75.

Messrs. ROBT. CROOKS & Co. of Liverpool, under date of Nov. 30, say of Tin Plates:—"All descriptions, with the single exception of Coke Ternes, are now firmly held for an advance in no case less than 6d, and in many instances 1s per box above lowest rates. Though not many transactions, so far, have been put through on the higher figures, holders are sanguine that these will soon be paid, as there is enquiry for large quantities, which buyers show considerable desire to place."

Lead.—There is not enough doing in this article to establish a quotation; ordinary domestic is quoted 6·05c.@6·10c. currency. Missouri soft is quoted in St. Louis at 5⅞c. currency, with freights to New York at 27c. per 100 lb.

Spelter and Zinc.—There is nothing doing in domestic spelter, which is quoted, according to quality, at 6⅛@6¾c. currency. Sheet zinc is without change at 8¼@8½c. currency.

Antimony.—This article, although sharing the quietness of other metals, is a little firmer at 13¼c.@13⅜c. gold.

Quicksilver.—This article has declined in this country, although it is unchanged in Europe. The quotations are as follows: in this city, 55c., gold, per lb., and in San Francisco, 50c.@52½c. The London price is £8 10/ per flask. We are in receipt of the report of production of the Quicksilver Mining Company, for the eleven months of this year, ending with November 30, which shows that the production for that period was 18,049 flasks as against 12,148 flasks for the corresponding period of 1875, and 9,084 flasks for the whole of 1874. This is, certainly, a very favorable report.

The San Francisco *Commercial Herald* of December 7, says of quicksilver: "As before intimated, the production for November was the heaviest of the year, exceeding 7,300 flasks. The exports by sea for the same period about 3,600 flasks. The steamship *City of Tokio* for Hong Kong and Yokohama carried in all 1,691 flasks. Since her departure we learn of a resale of 200 flasks intended for this steamer costing 52½c. by a Chinaman. The closing price is 50c."

FINANCIAL.

New York Stocks.

NEW YORK, FRIDAY EVENING, Dec. 15, 1876.

68,113 shares comprise the total sales of our list at the New York Stock Board during the week just closed. This is a falling off of about 18,000 shares from the business reported in our last. With a single exception the quotations are well sustained; various rumors have prevailed during the week, regarding the patching up of a new coal combination, and this has had the effect in giving tone to the list. This rumor, probably, grew out of the meeting of the Lehigh coal operators, which was held in Philadelphia this week, relative to making a reduction of wages.

New Jersey Central Railroad.—17,745 shares of this stock have changed hands at from 33 to 34⅝, closing ⅞ per cent. above the lower price.

Mariposa Land and Mining Company.—This stock has been very active during the week, and quite an advance has taken place, the total sales amounting to 3,108 shares, closing at $8¼.

Consolidated Coal Company.—20 shares of this stock were sold on the Board during the week at $34 per share.

Delaware, Lackawanna and Western Railroad.—About 45,000 shares of this stock sold at from 70⅞ to 72, closing at 71¼.

Delaware and Hudson Canal.—This stock has been comparatively steady, the quotations ranging from 70 to 71, closing at the former figure, the sales amounting to 1,619 shares.

Lake Superior Iron Company.—The Trustees of the Sinking Fund of this company have advertised for the purchase of the company's first mortgage bonds to the amount of $40,000,

Chesapeake and Ohio Canal Company.—The annual report of this company shows that its receipts for the last year have been $1,599,512.55, and its operating expenses $1,243,035.95.

Consumers' Benefit Coal Company.—We note a recent auction sale of 20 shares of the stock of this company at $1.50 for the lot.

Passaic Zinc Company.—The annual meeting of this company will be held on the 16th of January next.

Union Pacific Railroad Company.—This company has declared a dividend of 2½ per cent., payable on the 1st of January next.

The Straight Shoot Railroad.—The Straight Shoot Railroad Company of Virginia has made a contract for the completion of its entire line from Richmond to Lynchburg, and its connection with the Chesapeake and Ohio Railroad at Clifton Forge, within the next three years. The road is about two hundred miles long, and will, for its entire length, occupy the valley of the James River. The contractors agree to receive about four-fifths of the price in the stock and bonds of the company. It is claimed that this will make a new outlet for the West Virginia coal fields, and it is also claimed that the iron belt traversed by it is the richest and most extensive east of Missouri.—*Railway Age.*

Columbus and Mineral Valley Railroad.—An assessment of 10 per cent. on all subscriptions to the stock has been ordered, payable January 1. The contract for the grading of the line from Columbus, Ohio, to a connection with the Ohio Central at Bush station, is to be let soon. The intention is to build to Bush station, use the track of the Ohio Central and the Cincinnati and Muskingum Valley roads from that point to Moxahala, and then to build from Moxahala by Ferrara into the Hocking Valley coal field.

Menomonee River Railroad.—The contract to build the Menomonee River Railroad has been awarded to D. L. WELLS & Co, of Milwaukee. The new road will leave the Chicago and Nortwestern at Spaulding, twenty-two miles southwest from Escanaba, and passes Breen, Brietung and Quinesee iron mines, and terminates for the present at Menomonee River, the boundary line between Wisconsin and Michigan.

Joplin and Girard Railroad.—Since the completion of the Joplin, Mo., and Girard, Kan., road into the coal fields of Baker Township, Jasper County, the yield of coal along that road has extended to the amount of 40,000 bushels of coal per week. The company's bank has just tairly commenced taking out coal. They have everything rigged conveniently, and when they get their proper force at work they can easily take out 100 car loads a day. A man from Joplin has contracted with the company for taking out 5,000 car loads or 7,500,000 bushels.

Salt Lake City and Coalville RR.—The construction of a narrow gauge road from Salt Lake City, Utah, to Coalville by way of Park City, is strongly advocated, and several meetings have been held to devise a plan for its construction. Most of the coal supply of Salt Lake comes from Coalville mines, and is carried by the Union Pacific and the Utah Central roads. It is charged that the former company does not give the facilties for the traffic which it ought to do, and that the business is embarrassed in consequence.

Parker and Karns City Railroad.—A correspondent writes as follows of this road and its lately completed extension from Kansas City, Pa., to Butler: "The route of this road is through the heart of the oil regions of Butler County; it is estimated that within three miles of the road on either side, within its length of 28 miles, 2,000 barrels of oil are produced daily, and owing to the large population the gross earnings are almost equal to those of the main stem of the Denver and Rio Grande, 120 miles long. To the President, S. D. KARNS, and Superintendent, W. C. MOBLEY the road owes its origin and success, Mr. KARNS owning half the entire line."—*RR. Gazette.*

Potomac, Fredericksburg and Piedmont Railroad.—The Royal Land Company, which lately purchased this road, formerly the Fredericksburg and Gordonsville, has now twenty-eight miles of the line from Fredericsburg, Va., completed and in running order, and ten miles more to Orange Court House, on the Virginia Midland, are ready for the rails. The company has also purchased the Shenandoah Valley and Ohio Road, and will build it from the coal mines near Harrisonburg to Orange Court House, making a narrow-gauge line about 100 miles long, from Harrisonburg to tide-water. The company owns 200,000 acres of coal lands in the Shenandoah Mountains, and owns and controls a large body of land rich in hematite and other iron ores. The company intends, as soon as the road is completed from Fredericksburg to Orange Court House to put a mortgage on its entire property, under which 8 per cent. bonds, having thirty years to run, will be issued to provide means for the completion of the road.—*Railroad Gazette.*

Quotations and Sales of Stocks and Bonds.

For the week ending Dec. 15, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Pennsylvania Coal Co	—	—	250	—
Consolidation Coal Co	—	—	35	20
Spring Mt. Coal Co	—	—	†60	—
American Coal Co	—	—	*54	—
Maryland Coal Co	—	—	11	—
Del., Lack., and West. RR. Co	72	70⅞	71¼	45,161
New Jersey Central RR. Co	34⅝	33	33⅞	17,745
Delaware and Hudson Canal Co	71	70	70	1,679
Quicksilver Mining Co. pref'd	18	18	18	200
" " " Common	13	13	12	100
Mariposa Land & Min. Co. pref'd	8½	4	8¾	3,108
St. Louis & Iron Mountain RR	11¾	11¾	14⅞	100
Total Shares sold				68,113
Sales for the week previous				86,160
Decrease				18,017

*Nominal. † Asked,

BONDS.

	Inter'st	Sales.	Price.
Del., Lack. & West. 2d M	M. & S.	....	.... @108¼
" " " 7's Con'ble	J. & D.	....	.... @106½
Cent'l RR. of N.J., 1st M., New	F. & A.	....	.... @108¾
" " " 1st Cons	.....	8,000	.... @ 82½
" " " Convert'le	M. & N.	11,000	78½@ 78¾
Lehigh & W.-B'e, Con. Guar'd	.....	4,000	@ 61
Am. Dock & Imp. Mt. Bonds	J. & J.	....	.... @ 66
Del. & Hud. Can., 1st M., 1891	.....	15,000	.... @103½
" " " 1884	....	5,000	.... @103
" " " 1877	.....	....	.... @101½
" " " Coup. 7's, 1894	.....	....	.... @ 98
" " " Reg'd 7's, 1894	.....	.....	.... @ ....
St. L. & Iron Mountain, 1st M	F. & A.	12,000	101¼@101½
" " " 2d M	M. & N	.....	.... @ 70
Chesapeake & Ohio 6's, 1st M	.....	....	.... @ 31
" " " Ex. Coupon	.....	.....	.... @ 20
Mariposa Gold Loan con. 7s	.....	.....	.... @100⅝
Total sales		$55,000	

Closing quotations, in the absence of sales, represent the latest prices bid.

Philadelphia Stocks.

PHILADELPHIA, Thursday Evening, Dec. 14, 1876.

THIS market has been fairly active during the period under review, the total sales amounting to 133,718 shares, an increase of nearly 57,000 shares. Without exception, the list shows an advance, with the bulk of the sales confined to Reading Railroad.

Pennsylvania Railroad.—This stock has advanced to 47, the total sales amounting to 56,228 shares.

It is estimated that the entire number of passengers carried during the six months of the Centennial Exhibition exceeds 3,500,000, and to accommodate this multitude 22,542 trains, composed of 144,264 cars, were despatched. The greatest day's receipts came in on the 24th of October, when 48,700 persons were transported over the road, and $58,000 were received for tickets. The company had to employ over 3,000 attendants, and was compelled to borrow cars from other lines, many of which have been but just returned.

This company has accepted the New Holland extension of the East Brandywine and Waynesburg Railroad, and settlement has been made with the contractor.

Reading Railroad.—67,388 shares of this stock have changed hands at from 19¾ to 20¼, at which price it closed.

The Philadelphia correspondent of the New York *Bulletin* notes a rumor that negotiations are in progress between this company and the Baltimore and Ohio, having for their objectthe transfer to the latter company, of the leases now held by the Reading of the Reading and Columbia road, and the Susquehanna Canal, from Columbia to Havre de Grace. The object of the Baltimore and Ohio is said to be the acquirement of a line to the anthracite regions of Pennsylvania. A very considerable coal business is done over the Reading and Columbia road, and by boat down the canal to Havre de Grace, and thence to points on Chesapeake Bay. The lease, however, would give the Baltimore and Ohio only the water connection, as it has no rail connection with Columbia.

Lehigh Valley Railroad.—This stock closes stronger, the final price of 48¼ being equal to an advance of 2⅛ per cent.

Lehigh Coal and Navigation Company.—About 9,000 shares of this stock have changed hands at from 27⅜ to 28½, closing at the highest figure.

The Fairmount Coal and Oil Company announces a dividend of two per cent., payable on the 16th instant.

Pennsylvania Canal.—It is said that a railroad track is to be laid in the bed of this canal from Huntington, Pa., west to Williamsburg.

The Schuylkill Valley Navigation and Railroad Company, the Mill Creek and Mine Hill Navigation and Railroad Company, and *the Mount Carbon and Port Carbon Railroad* have announced that they will hold an annual meeting of their respective stockholders on the 25th inst. at the same hour and place in this city.

Shamokin Valley and Pottsville Railroad Company.—We note a recent auction sale of 10 shares of the stock of this company at $24 per share.

National Oil Refining Company.—We note a recent auction sale of 150 shares of the stock of this company at $30 for the lot.

Clarion and Alleghany River Oil Company.—The annual meeting of this company will be held at Kittaning, Pa., on the 9th of January next.

Quotations and Sales of Stocks and Bonds.

For the week ending Dec. 14, 1876.

STOCKS.

	Highest	Lowest	Closing	Shares sold.
Lehigh Valley RR. Co	48¼	46½	48¼	1,155
Pennsylvania RR.	46¾	45¼	46¾	56,228
Reading RR.	20¼	18¼	20¼	67,388
Lehigh Coal and Nav. Co	28½	27⅜	28⅜	8,895
Penn. Canal	—	—	—	—
Buck Mountain Coal Co	—	—	*25	—
Fulton Coal Co	—	—	—	—
Locust Mountain Coal Co	—	—	—	—
Westmoreland Coal Co	—	—	*85	—
St. Nicholas Coal Co	—	—	—	—
Cambria Iron Co	—	—	14	—
Crane Iron Co	—	—	*25	—
Emaus Iron Co	—	—	—	—
Pennsylvania Salt Manufact. Co	63½	62	62	53
Total shares sold				133,718
Sales for the week previous				76,744
Increase				56,974

* These quotations are nominal.

BONDS.

	Sales.	Price
H. and B. T. RR. 1st mortgage, 7s	$ —	— @107
" " " 2d " "	—	— @102
" " " 3d cons	—	— @ 35
Lehigh Valley RR. Con. mtg. 6s	2,000	— @ 98¼
" " " 7s, 1910	3,000	115¼@115½
" " " 6s Reg	—	— @107
" " " 6s coup	—	— @106
Pennsylvania RR. 1st mtge. 6s	—	— @108
" " " gen. " cou. 1910	1,000	— @109
" " " gen. " 6s, reg	5,000	— @107¾
" " " Cons. M. 6s reg.	—	— @101
Phil. & Reading RR. Con. M. 7s Reg	21,000	91 @ 92½
" " " 6s, 43 & 44-80	4,000	103 @103⅜
" " " 7s 1893	5,000	103¾@104
" " new convertible 7s	17,000	70 @ 70
" " 6s 1880	7,000	— @103½
" " Cons M. 7s coup	27,000	91½@ 92
" " debenture 6s	500	— @ 60
" " 6s gold coupon	1,000	— @ 95
Phil. & Reading C. & I. Co. Leb. 6s	—	— @ 69
" " Helfenstein tract	—	— @ 65
Lehigh Coal & Nav. Co., 6s '84	6 000	103½@104
" " " RR. 6s, '97	—	— @101
" " " con. 7s	—	— @ 90
" " " 6s gold loan	5,000	101 @101¾
" " " Conv. gold loan	—	— @101¼
Penn. Canal, 6s	—	— @ 73
Penn. and N. Y. Canal, 7s	1,000	— @109
Ches. and Del. Canal, 6s	—	— @ 85
Susquehanna Canal, 6s	—	— @ 68
Delaware Division Canal, 6s	—	— @—
Susquehanna Coal Co. 6s	—	— @ 78
Buck. Mount Coal Co. 6s	—	— @—
Penn. Gas Coal Co. 6s	—	— @—
Honeybrook Coal Co. 7s	—	— @—
Total amount of sales	$105,500	

Closing quotations, in the absence of sales, represent the latest prices bid.

Copper Stocks.

Specially reported by Messrs. WILSON W. FAY & Co., Bankers and Brokers, Room 7 Traveller Building, 31 State Street, Boston.

BOSTON, THURSDAY EVENING, Dec. 14, 1876.

THE market closes to-night very weak, and literally nothing doing. It seems as if it was duller than in mid summer. The sales are very meager, and, as is the case invariably on such a market, prices all tend downward. Calumet has actually gained one point the past week, closing strong at 172 bid. Copper Falls holds its own remarkably well on such a market at 3¾ bid, although a few shares are offered at 4. No amount of stock could be purchased at any like present figures. Duncan, as usual, has been the card, selling on the 11th at 5¼, and breaking down to 3¾ this afternoon late. The impression on the street is that that the mine is no more than paying expenses, if it is that, and that to develope it, in case the company really has silver there, will take a considerable sum of money yet in the shape of assessments. Under these circumstances the street are inclined to sell the stock, and the inside parties, for some reason or other best known to themselves, do not attempt to change the current. Inlernational feels the decline in Duncan to some extent, but closes ¾ bid, only ¼ lower than the highest point this week. Pewabic is better at 2¼ bid, and very little stock offering. The late decline in this stock has evidently been made for the purpose of allowing some parties to get in a little stock at low figures. In small coppers there is nothing doing.

LATER —4 P. M.—Duncan has broken to 3⅜, and offered at that. 3¾ bid.

Copper Products for November are reported as follows: Calumet and Hecla, about 1,096 tons; Franklin, 130 tons, 1,650 pounds, Pewabic, 22 tons 1,059 pounds, total about, 153 tons; Osceola, 140 tons; Quincy, about 207 tons.

Gold and Silver Stocks.

AMERICAN MINING AND STOCK EXCHANGE.

NEW YORK, FRIDAY EVENING, Dec. 15, 1876.

DURING the past week this board has passed through a revolution and has elected a new President, Mr. GEORGE TUTHILL, a gentleman who stands well in the community, and who has had this honor thrust upon him unsolicited. Presidential elections seem this year to be most uncertain in their results, for Mr. WARD still claims to be president, and there are, consequently, "two Richmonds in the field." Since the objections to the proceedings in this new board were not in any way due to the President, it is difficult to see how this move can better matters. There are also rumors that the board is to call railroad stocks and that JAY GOULD will take an interest in it, either of which events would probably prove disastrous to it. There is practically no *bona fide* business doing in mining stocks here, and the course adopted by the American Mining and Stock Exchange is not calculated to encourage or promote a revival of interest in this class of investment.

MINING STOCKS.

AMERICAN MINING AND STOCK EXCHANGE.

Name of Company.	Location.	Feet on Vein.	Capital Stock.	a No. of Shares.	Total Assessments Levied.	Date and Amount of Last Assessment per share.	Total Dividends paid.	Date and Amount of Last Dividend per share.	Closing Quotations g American Currency. Sat.	Mon.	Tues.	Wed.	Thurs.	Fri.	Shares sold during the week.
Alpha Cons. G. S.	Nevada,	300	$ 3,000,000	30,000	$180 000	Aug. 12, '75, $1.	....	.....	$39 00	$37 00	$35 50	....	$37 25	$37 50	1,050
Belcher, G. S.	Nevada,	1,040	10,400,000	104,000	660,400	April 14, '71, $1.	$15,397,200	April 10, '76, $1.	15 00	14 62½	14 37½	15 00	15 12½	14 75	1,180
Bertha Gold Co.	Virgi'a.	645 acs.	300,000	30,000	**	.....	....	.....	2 87½	2 87½	2 87½	3 37½	....	3 00	4,650
Best and Belcher, G. S.	Nevada,	545	10,080 00	100,800	136,192	July 13, '74, 50c.	....	.....	49 00	47 75	46 75	48 75	47 00	48 25	1,930
Bullion, G S.	Nevada	943½	10,000,000	100,000	2,052,000	Sept. 22, '76, $2.50.	....	.....	35 00	....	33 00	36 37½	33 00	32 50	1,300
Caledonia, G. S.	Nevada,	2,188	10,000,000	100,000	1,210,000	Aug. 28, '76, $1.00.	....	.....	14 50	*14 00	13 50	13 75	13 12½	13 75	1,800
California, G. S.	Nevada,	600	54,000,000	540,000	....	.....	7,560,000	Nov. 15, '76, $2.	50 00	*57 00	51 87½	51 50	53 75	51 50	325
Centennial, G.	Califor.	66 acres	1,000,000	100,000b	**	.....	....	.....	....	....	....	....	....	....	....
Chollar Potosi, G. S.	Nevada,	1,400	2,800,000	28,000	1,282,000	June 26, '76, $5.	3,080,000	Feb. 10, '72, $1.	90 00	86 50	85 50	*89 00	88 87½	88 25	840
Cleveland, G.	Colo.	3,715	250,000	25,00.b	....	.....	....	.....	9 25	9 00	9 25	9 75	9 50	9 12½	4,300
Cons. Hercules & Roe, s	Colo.	16,500	1,000,000	100,000	**	.....	120,000	.....	....	....	....	....	....	2 25	1,500
Cons. Imperial, G. S.	Nevada,	468	50,000,000	500,000	125 000	July 25, '76, 25c.	....	.....	3 12½	2 87½	2 75	2 50	2 75	*2 87½	4,100
Con. N. Slope & E.C.T.	Colo.	15,000	500,000	10,000	**	.....	....	.....	9 00	....	*5 00	....	5 00	4 87½	300
Cons. Virginia, G S.	Nevada,	710	54,000,000	540'000	411,200	June 11, '73, $3.	24,840,000	Nov. 11, '76, $2.	53 50	48 75	45 00	45 25	47 50	46 00	395
Confidence, G. S.	Nevada,	130	2,496,000	24,960	243,840	March 18, '73, $1.	78,000	May 1, '65, $8.33½	14 00	13 25	13 00	*13 75	13 00	13 00	1,550
Crown Point, G. S.	Nevada,	600	10,000,000	100,000	1,173,370	Oct. 26, '76, $1.	11,588,000	Jan. 12, '75, $2.	9 50	9 00	9 00	*9 50	9 00	9 12½	1,200
Douglas Mining Co.	Colo.	21,000	1,000,000	10,000	**	.....	....	.....	....	....	....	....	....	....	....
Eureka Cons. G. S. L.	Nevada,	..	5,000,000	50,000	100,000	May 26, '76, $1.	1,000,000	Aug. 5, '75, $1.	....	....	....	*12 00	....	....	....
Exchequer, G. S.	Nevada,	400	10,000,000	100,000	280,000	Sept. 23, '76, $1.	....	.....	14 62½	11 00	13 50	12 50	12 75	14 00	2200
Gould and Curry, G. S.	Nevada,	621	10,800,000	108,000	2,018,000	Dec. 11, '76, $1.	3,934,000	Oct. 10, '70, $10.	14 75	13 00	12 00	14 12½	13 00	13 50	1600
Grant, G. S.	Nevada,	1,000	10,000,000	100,000	....	.....	....	.....	8 37½	8 50	8 50	9 25	9 12½	8 25	13,700
Granville Gold Co.	N. Car.	9,000	1,000,000	100,000	**	.....	....	.....	3 00	3 00	2 87½	3 00	3 12½	3 00	9,550
Hale & Norcross, G. S.	Nevada,	400	11 200,000	112,000	2,242,000	Oct. 10, '76, $1.	1,598,000	April 10, '71, $5.	8 25	7 00	8 00	7 25	7 50	8 12½	3,700
Hukill, S.	Colo.	3,883	1,000,000	10,000	**	.. ...	20,000	Nov. 1, '76, $1	....	....	....	....	....	....	.....
Indian Queen, S.	Nevada,	1,000	3 000,000	60,000	....	.....	60,000	.....	....	....	....	....	....	....	.....
Julia Cons. G. S.	Nevada,	3,000	11,000,00	110,0 0	110,000	Sept. 11, '76, $1.	....	.....	6 87½	6 50	*6 50	5 75	6 50	7 12½	3,650
Justice. G. S.	Nevada,	2,100	10,500,000	105,000	1,502,500	Sept. 14, '76, $5.	....	.....	27 00	*30 00	24 00	27 00	27 75	27 00	3 0
Kentuck, G. S.	Nevada,	95	3,000,000	30,000	270,000	Dec. 3, '74, $1.	1,252,000	March 8, '70, $5.	11 00	10 75	*9 87½	9 75	10 00	*10 25	1,050
Kossuth, G. S.	Nevada,	2,700	5,400,000	104,0000	405,000	Aug. 15, '76, 50c.	....	.....	*2 25	....	2 25	....	1 75	2 00	1,000
Leopard, G. S.	Nevada,	1,500	5,00 ,00	50,000	50,000	March 31, '76, $1.	137,500	Nov. 15, '76, 50c.	6 87½	....	6 25	6 75	6 75	7 00	3,000
Luzerne Mining Co.	Colo.	4,200	5,000,000	500,000	**	.....	....	.....	2 50	2 62½	2 62½	2 50	2 62½	2 62½	6,100
Mer. and Min. Tun. Co.	Colo.	30,000	500,000	50,000	**	.. ...	....	.....	....	....	....	....	....	....	....
Merrimac, S.	Mass.	600	10,000,00	100,800	100,800	Sept. 5, '76, 50c.	....	.....	4 25	4 62½	5 00	5 12½	5 12½	5 00	9,400
Mexican, G. S.	Nevada,	1,500	500,000	50,000b	**	.....	10,000	Nov. 10, '76, $1.	24 50	23 75	21 50	23 00	22 25	23 50	2,200
Morning Star.	Nevada,	1,600	8,000,000	8 ,00	....	.....	....	.....	....	....	....	....	....	....	.....
Northern Belle, S.	Nevada,	1,600	5,000,000	50,000	....	.....	900,000	Nov. 15, '76, $1.	*38 00	*40 00	*40 00	37 50	36 00	35 00	550
Ophir, G. S.	Nevada,	675	10,080,000	100,800	2,031,400	May 14, '75, $2.	1,394,400	March 9, '64, $4.	40 50	43 50	39 50	41 25	39 50	32 87½	1200
Original Comstock, G. S.	Nevada,	....	10,000,000	10,000	....	.....	....	.....	....	*50	....	*50	....	*87½	....
Overman, G. S.	Nevada,	1,200	3,840,000	38,400b	2,222,280	Oct. 21, '76, $3.	....	.....	130 00	....	*125 00	127 00	125 00	115 00	420
Pleasant View.	Colo.	1,200	200,000	20,000	**	.....	....	.....	....	*2 00	*1 87½	*1 62½	....	1 62½	100
Raymond and Ely, G. S.	Nevada,	5,000	3,000,000	30,000	540,000	Dec. 15, '75, $1.	3,075,000	Sept. 10, '73, $3.	3 75	*3 50	....	3 50	3 62½	3 75	1900
St. Joseph Lead Co.	Missou.	2500 acs	1,000,000	100,000	....	.....	210,000	.....	6 25	*7 00	....	*7 00	6 00	6 12½	.....
Santiago, G. S.	Nevada,	2,000	11,200,000	112,000	....	.....	....	.....	....	....	....	....	....	....	.....
Savage, G. S.	Nevada,	800	11,200,000	112,000	2,858,000	Nov. 25, '76, $1.	4,460,000	June 11, '69, $3.	12 50	11 25	12 00	12 50	11 25	10 50	3,800
Seg. Belcher, G. S.	Nevada,	160	640,00	6,400	244,800	April 11, '76, $5.	....	.....	*104 00	88 00	*88 00	93 50	93 50	93 25	635
Sierra Nevada, G. S.	Nevada,	3,650	10,000,00	1 0,000	1,500,000	Oct. 24, '76, $1.	102,500	Jan. 16, '71, $1.	13 25	....	*13 25	13 50	12 50	12 75	1500
Silver City, G. S.	Nevada,	3,900	6,310,000	63,100	75,775	Nov. 16, '76, 25c.	....	.....	....	....	....	*75	*1 25	*1 25	.....
Silver Hill, G. S.	Nevada,	5,400	10,800,000	108,000	810,00.	Sept. 18, '76, $1.	....	.....	11 00	11 00	....	10 25	10 75	10 25	1,900
South Comstock, G. S.	Nevada,	1,500	10,000,000	100,000	44,000	May 3, '76, 10c.	....	.....	....	....	....	....	....	....	.....
South. California, G. S	Nevada,	1,500	5,000,0 0	50,000	....	.....	....	.....	....	....	....	....	....	....	.....
Southern Star, G. S.	Nevada,	1,500	6,000,000	600,000	....	.....	....	.....	*1 12½	....	*1 25	*1 12½	....	*1 50	.....
Trenton, G. S.	Nevada,	..	10,000,000	100,000	....	.....	....	.....	....	....	*8 00	....	....	....	.....
Union Cons. G. S.	Nevada,	850	10,000,000	100,000	260,000	March 3, '76, $1.	....	.....	13 50	12 25	....	11 50	12 00	12 25	1,850
West Belcher, G. S.	Nevada,	1,000	10,000,000	100,000	....	.....	....	.. ...	....	....	*1 75	2 75	*2 75	*2 75	300
Yellow Jacket, G. S.	Nevada,	1,200	12,000,000	120,000	2,718,000	Oct. 28, '76, $1.	2,184,000	Aug. 10, '71, $2.50.	18 75	19 00	18 50	18 75	17 50	18 75	2400
Young America, S.	Nevada,	1,000	3,000,000	30,000	6,000	Oct. 23, '76, 20c.	....	.....	....	....	....	....	....	....	.. ..

Assessments levied to date, $27,905,537 | Div'ds pd. to date, $83,001,400 | Total sales.....100,625

BOSTON STOCK MARKET.

									Fri.	Sat.	Mon.	Tues.	Wed.	Thurs.	
Allouez, C.	Mich	..	$1,000,000	20 000c	$940,020	May 9, '76. $5.	....	.....	$8 00	8 25	8 00	8 00	8 00	5 00	.....
Calumet and Hecla, C.	Mich.	¾ mile	2,000,000	80,000d	1,200,000	.....	$11,050,000	Oct. 21, '76, $5.	171 00	171 00	171 00	171 50	172 00	172 00	.....
Central, C.	Mich.	..	500,000	20,000c	100,000	June, '62, 65c.	1,020,000	Feb. 17, '76, $5.	35 00	35 00	35 00	35 00	35 00	35 00	.....
Copper Falls, C.	Mich.	..	1,000,000	20,000d	535,000	May 10, '76,	100,000	Nov., '71, $1.	3 75	3 75	3 81¼	3 87½	3 93¾	3 87½	.....
Dana, C	Mich.	..	500,000	20,000d	68,020	Jan., '73, 50c.	....	.....	10	10	10	10	10	10	.....
Dawson, S.	Canada.	..	1,200,000	60,000f	....	.....	....	.....	10	10	10	10	10	10	.....
Duncan, S.	Canada.	..	1,200,000	60,000f	75,000	July, '76. 41⅔.	....	.....	4 50	4 75	5 25	5 00	4 50	4 12½	.....
Franklin, C	Mich.	..	500,000	20,000d	360,000	June, '68, $5.	585,000	Nov., '71, $1.	13 50	13 62½	13 62½	13 50	13 62½	14 00	.....
†Humboldt, C.	Mich.	..	500,000	20,000d	100,000	Sept. 28, '76, 15c.	....	.....	17	17½	18	18	18½	19	.....
International, S.	Canada.	..	1,200,000	60,000f	....	.....	....	.....	37½	43¾	50	43¾	37½	41¾	.....
Madison, C.	Mich.	..	500,000	20,000d	123,000	Sept. 11, '74, 10c	....	.....	27	28	28	28	26	26	.....
Mesnard, C.	Mich.	..	500,000	20,000d	160,000	April 12, '65, 50c.	....	.....	28	29	29	29	28	28	.....
Minnesota, C.	Mich.	..	1,000,000	20,000e	436,000	June 10, '69, $2.	1,820,000	Mch. 15, '76, 50c.	1 50	1 43½	1 62½	1 50	1 56¼	1 50	.....
National, C.	Mich.	..	500,000	20,000e	195,000	Oct., '75, $1.	360,000	Oct., '73, $1.	1 25	1 31¼	1 37½	1 37½	1 37½	1 37½	.....
Osceola, C.	Mich	..	1,000,000	40,000d	830,000	May 1, '76, $2.	....	.....	18 50	18 62½	18 50	18 62½	18 50	19 00	.....
Petherick, C.	Mich.	..	500,000	20,000d	165,533	March 22, '75, 50c.	....	.....	50	50	45	45	37½	37½	.....
Pewabic, C.	Mich.	..	500,000	20,000d	185,000	June, '68, $3.	460,000	July, '73, $1.	2 12½	2 25	2 37½	2 50	2 50	2 50	.....
Phenix, C.	Mich.	..	1,000,000	20,000d	817,500	Sept., '70, $3.	....	....	....	....	....	....	....	....	.....
Quincy, C.	Mich.	..	h 200,000	20,000b	....	.....	2,050,000	Oct. 28, '76, $3.	46 75	46 87½	46 75	46 87½	46 87½	47 00	.....
Ridge, C.	Mich.	..	500,000	20,000d	....	.... ..	....	.....	5 00	5 00	5 00	5 00	5 00	5 00	.....
Rockland, C.	Mich.	..	500,000	20,000d	495,000	Jan., '74, $1.	....	.....	25	25	25	25	25	25	.....
Star, C.	Mich.	..	500,000	20,000d	265,000	March 30, '76, 50c.	....	.....	35	35	33	34	35	35	.....
Superior, C.	Mich	..	500,000	20,000d	346,000	March, '74, 25c.	....	.....	12½	12½	12½	12½	12½	12½	.....

Assessments levied to date, $7,440,033 | Div'ds paid to date, $17,445,000 | Total sales ..... —— shares.

G. Gold. S. Silver. L. Lead. C Copper. a The par value of shares is $100, unless otherwise designated. b Par value $10. c Par value $50. d Par value $25 each. e Par value $15. f Par value $20. g Closing quotations represent the latest prices bid. Prices asked will have a * affixed. h Full paid. i On the four old companies. ** Not Assessable. †Ass. 15c. paid.

Justice.—Daily yield, 300 tons of ore. The Pacific mill has been added to the crushing capacities of the mine, so that the ore is being reduced as fast as it is extracted. The ore stopes going north on the 400 and 600 feet levels are still producing fine ore, the ledge holding a uniform width of about 30 feet. A winze is being sunk on the ore vein below the 400-feet level, which is showing ore just as rich as that found on any of the levels, either above or below. The appearances are that on the 500, 600 and 700-feet levels the body of ore developed extends much farther to the northward than was ever expected by the most sanguine experts that have ever examined the mine. On the 800-feet level crosscuts Nos. 1 and 2 are both steadily advancing, both showing more quartz and ore, and an improved appearance in the formation penetrated. The winze sinking on the ore vein below the 800-feet level is steadily developing rich ore, with every appearance of its extension downward to the 1,000-feet level. The southeast drift on the 1,000-feet level is encountering a gradual change in the rock formation that betokens a near approach to the main ledge at that point.

Consolidated Virginia.—Daily yield, 400 tons of ore, keeping the mills running up to their full crushing capacities. The ore breasts on the 1,400, 1,500 and 1,550 feet levels are all showing well as usual. On the 1,700-feet level the north drift has been cleaned out, repaired and work in the face resumed. The side railroad track to the C. and C. shaft for the shipment of ore from that point is nearly completed. The west drift on the 1,600-feet level of the C. and C. shaft is in 400 feet, the face in soft ground with considerable broken, shelly rock, that compels the driving of spiling ahead, to secure the drift against caving. It was the intention to have divided this drift into two, at a point about 380 feet from the shaft, one to be run in a northwesterly course into the California ground, while the other would turn to the southwest and penetrate the Consolidated Virginia ledge. Owing to the striking of the soft character of ground now being penetrated, this has had to be abandoned, unless a more favorable formation may yet be encountered before reaching the ledge.

California.—Daily yield, 400 tons of ore. The ore breasts at all points on the 1,500 and 1,600 feet levels are yielding rich ore and are showing well. The general features of the mine never appeared more prosperous than at the present. The face of the south drift in the ore body on the 1,600-feet level is still good ore. A portion of the week was consumed in putting a steel rail car track in this drift, so that the progress made has not been quite so great as it usually is. Sinking the C. & C. shaft is making good progress, the bottom still being in hard blasting rock, and the flow of water very steady and strong. The pump-bob and station, 50 feet below the 1,650-feet level, is completed.

Yellow Jacket.—Sinking the new shaft is making splendid progress, the bottom in good sinking ground, and the work being pressed ahead with great vigor. It is now down 155 feet. The side track of the railroad is nearly completed, which will make the site of the shaft one of the most convenient and easily accessible on the line of the Comstock. Sinking the south winze is progressing as fast as possible, to reach and connect with the south drift, now being run on the 2,040-feet level. This winze will, in all probability, reach the 2,040-feet level and complete the connection with the drift by the middle of the present month. As soon as this connection is made and ventilation obtained, two new crosscuts will be started on that level to develop the ledge further to the southward than it has yet been prospected. The air connection recently made with the Imperial is gradually cooling every portion of the mine and placing it in a better condition for work than for many months past.

Imperial Consolidated.—Sinking the north winze below the 2,100-feet level is making good progress. It has very nearly reached the point at which it is intended to start a drift south to connect with the north drift now being run from the bottom of the south winze. The north drift running from the bottom of the south winze on the 2,135-feet level is making good progress, the face in favorable ledge matter. The east crosscut on the 2,000-feet level is also making good progress, the face in soft ledge matter. Recent air connection on the 2,135-feet level with the Yellow Jacket Mine is gradually doing its work and is cooling the drifts and mine in every part. The pumping machinery is now working splendidly, and the flow of water gives but little trouble. The mine has not been in better condition for the past three years than it is at this time.

Bullion.—There is no change of any value in the east cross-cut on the 1,400-feet level. Some trouble has been experienced in completing the connection between the north drift and the winze on the 1,500 feet level. This connection will, in all probability, be completed to-day. The south drift on 1,500-feet level is developing a splendid body of quartz, with every indication of finding paying ore at no very distant day. The heat in the drifts on the 1,500-feet level is intense, and necessarily makes the progress very slow until better air can be obtained. The prospecting drifts on the 1,600-feet level are making good progress, but afford no new features. The north drift on the 1,700-feet level shows no change. The north drift on the Alpha ground is still advancing along the west wall of the ledge, the face in a very favorable formation.

Ophir.—Daily yield, 220 tons of ore. The ore-breasts on the 1,600-feet level are showing finely. The west cross-cut from the bottom of the winze on the 1,650-feet level is developing a fine body of good milling ore, the extent of which cannot yet be determined. Sinking the main incline is making good progress. It is now down 50 feet below the 1,700-feet level, has nearly reached the south line of the Mexican, the entire face in quartz carrying spots of good ore.

Sierra Nevada.—The flow of water at the bottom of the main shaft is gradually decreasing. The north and south drifts on the fourth station level are both being pushed vigorously forward, the face of each being in ledge matter of a very favorable character. On the first second and third levels, all the prospecting drifts both north, south and east, are being driven rapidly ahead without any important or valuable changes to record.

Julia.—The branch drift from the main south drift, on the 1 600-feet level, running to connect with the Ward shaft, is being pushed rapidly, following the vein of quartz and ore recently struck by the main drift This vein of quartz has widened out to about eight feet, and is of a very fine character. The west cross-cut from the main south drift, on the 1,800-feet level, is in quartz of the most encouraging character.

Overman.—The north drift on the 1,200-feet level has been stopped for the present. The south drift on that level is rapidly advancing, with very favorable ore prospects. The shaft has reached the 1,400-feet level, below which point a pump is being finished for the reception of the flow of water likely to be encountered in the ledge at that point. The 1,400-feet station will be opened and a drift started to cut and prospect the ore vein at that point in a very short time. The ore and ledge developments on the level's above are almost a sure guarantee that when the vein is opened, a paying mine will be developed. The erection of the new pumping machinery is rapidly approaching completion, and when finished will be one of the finest and most powerful pieces of machinery ever erected in the State of Nevada.

Chollar-Potosi.—Daily yield 100 tons of ore. This ore is crushed as fast as extracted, and yields but a small profit over and above the present cost of milling. Sinking the main incline is going rapidly forward, the bottom still being in very good blasting ground. Sinking the Combination shaft is making good progress.

Savage.—The pumps are kept steadily running, and the water is being gradually but surely lowered. It is now reduced to a point twenty feet below the 1,900-feet level. The pumps evidently have complete control of the situation.

Caledonia.—Sinking the shaft is going ahead as rapidly as the hard nature of the ground, and the steady, strong flow of water will permit. The north drift on the 1,100-feet level, running to connect with the Overman, is making good progress, the face in favorable ledge matter.

Hale & Norcross.—The pumps still keep up their regular stroke of 7½ per minute, keeping a steady flow of water pouring up from the bottom. During the week past the water has been lowered nearly 30 feet. It is now reduced to a point about 20 feet below the 1,900-feet level. The gain on the flow of the water is steady, but now appears to be permanent and uninterrupted.

Best and Belcher.—Crosscuts have been started on the 1,700-feet level to cut and prospect the ore vein at that point. The heat in the main drift and these crosscuts is intense, and necessarily causes very slow progress.

Belcher.—Daily yield, 200 tons of ore. Sinking the drain shaft is making excellent progress. Sinking the main incline is not doing so well on account of the strong flow of water encountered.

Sutro Tunnel.—Total length of tunnel this morning 15,211 feet. The face of the header continues in hard porphyry with small seams of quartz and clay. No increase of water.—*Gold Hill News*, Dec. 6th.

The Manhattan Silver Mining Company has declared its usual monthly dividend of $1 per share. The November bullion yield of this company amounted to about $96,000.

Gas Stocks.

NEW YORK, FRIDAY EVENING, Dec. 15, 1876.

The market for Gas Stocks is steady and very quiet. It is too early to notice the effect on the market caused by the conflict between the city and the companies regarding the recent bids for lighting the street lamps during the coming year. Should the companies not recede from their position, and the city authorities decline to recede to the terms proposed, it would undoubtedly result in a serious decline in the stocks of the companies interested.

Joplin, Mo., Gas and Coke Company.—This is a recent organization incorporated with a capital stock of $30,000.

Boston, Mass., Gas Company.—We note a recent auction sale of a small lot of this stock at $807.50 per share.

The Citizens' Gas Company, Cincinnati, Ohio, have recently organized, with a capital stock of $2,000,000 in shares of $50 each.

Washington, D. C., Gas Company.—We note a recent auction sale of 25 shares of the scrip stock of this company par $25, $5 paid, at $25 per share.

The Gas Commission met at the office of the Commissioner of Public Works, at 2 P. M. to-day. A letter was received from the Corporation Counsel in which he said that the bids of the gas companies "would seem to furnish conclusive evidence of collusion between the various companies by which the city is mapped out and divided up between them, and the city deprived of all competition." He recommended that they reject all the proposals, which they had the power to do.

A resolution was then adopted rejecting all the bids of the gas companies, and ordering that an advertisement be inserted in the *City Record* for proposals for lighting the street lamps and public buildings with gas for three months—from January 1 to March 31.

A cummunication was received from the Boston Globe Gaslight Company offering to light one thousand or more lamps one year with gasoline at much less than the city is now paying.

The Northern Ohio Hospital for the insane, manufactures its own illuminating gas. The Superintendent has just given to a citizen of Cincinnati a statement showing the cost of manufacture to be $1.44 for a thousand feet of gas, with coal at $4 a ton.

The following list of Companies in New York and vicinity are corrected weekly by GEORGE H. PRENTISS, Broker and Dealer in Gas Stocks, No. 30 Broad st., N. Y.

Companies in New York and Vicinity.	Cap. Stk.	Par.	last Dividend.	When Paid.	Bid.	Askd.
			pr.c			
Mutual, N. Y.....	$5,000,000	$ 100	2½	Oct. '76	101	103
" " Bonds	90,000	1,000	†3½	Aug. '76		109
NewYork, "	4,000,000		5	Nov. '76	135	136
Metropol. "	2,500,000	100	5	Sep. '76	145	—
" " Certf.	1,000,000	....	3½	" "	102½	104½
" " Bonds	500,000	1,000	3½	Dec. "		102½
Harlem "	1,850,000	50	4	Aug. '76	105	—
Manhattan"	4,000,000	50	10	July "	240	246
Brooklyn, B'klyn..	2,000,000	25	5	Nov. '76	179	181½
Nassau "	1,000,000	25	4	Jan. '76	80	—
" "Certf.	700,000	1,000	3½	Nov. '76	95	—
People's "	1,000,000	10	3½	Jan. '76	50	55
" "Certf.	300,000	1,000	3½	July '76	88	90
" " Bds	325,000	....	3½	Aug. "		95
Metropol. "	1,000,000	10	3½	Nov. '76	75	80
Wmsburgh "	1,000,000	50	3	Oct. '76	130	—
" "Certi.	1,000,000	....	3½	July "	101	102½
Citizen's "	1,200,000	20	2½	Jan. '76	95	100
" "Certf.	320,000	1,000	3½	Oct. "	98	100
J. C. N.J.....	750,000	20	5	July,'75	160	—
Centl. Westch. N.Y.	466,000	50	4	July. "	90	—
Subur'n " "	390,000	50				90

† Gold.

COMPANIES OUT OF TOWN.

We are reported no change in the quotations of the out of town companies, which, in the absence of transactions, are nominal. Our issue of Nov. 4 contains the prices of these, as were generally prevailing on that date.

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Each Head will Crush 120 TONS per Day of the Hardest Rock.

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It requires less water, occupies less space, and requires less labor than other Crushing Machines.

Only the best Materials and Workmanship are used in its construction.

*** For description and illustration of the Ball Stamp, and the cost of crushing ore, see ENGINEERING AND MINING JOURNAL, Dec. 2, 1876.

PORTLAND AND KEENE'S CEMENT.

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A Practical Treatise on Cement furnished for 25 cents.

PHILADELPHIA & READING RAILROAD COMPANY.
OFFICE, 227 SOUTH FOURTH STREET,
PHILADELPHIA, December 12th, 1876.

NOTICE is hereby given to the Stockholders of this Company, that the Annual Meeting and Election for President, six Managers, Treasurer, and Secretary, will take place on the second Monday, 8th of January next, at 12 M.

DAVID J. BROWN,
Secretary.

BLAST FURNACE CHEMIST.—A Metallurgist of five years' experience in Iron Manufacture, desires a place as Chemist, or in connection with the management of Blast Furnaces. Address Metallurgist, 37 Avon Street, Boston.

OFFICE PENNSYLVANIA COAL COMPANY.
TRINITY BUILDING, 111 BROADWAY,
NEW YORK, Dec. 14th, 1876.

The Pennsylvania Coal Co.

WILL SELL, AT PUBLIC AUCTION,

By Messrs. JOHN H. DRAPER & CO., AUCTIONEERS,

AT EXCHANGE SALES ROOMS,

(Basement of Trinity Building),

111 BROADWAY, NEW YORK,

On WEDNESDAY, the 20th day of Dec., inst.,

AT ELEVEN O'CLOCK, A.M.,

80,000 TONS

PITTSTON COAL,

of the usual sizes, deliverable at Erie Railway Coal Dock at Weehawken, during the month of January, 1877.

Delivery will be made, if desired, in Company's boats, at New York or Brooklyn, at a charge of Forty Cents per Ton additional to the sale price.

GEO. A. HOYT,
VICE-PRESIDENT.

139th Auction Sale.

50,000 TONS SCRANTON COAL,

On THURSDAY, Dec. 21st, 1876.

NEW YORK, Dec. 14th, 1876.

THE DELAWARE, LACKAWANNA AND WESTERN RAILROAD COMPANY will Sell, by Messrs. JOHN H. DRAPER & CO., Auctioneers, at the Company's Sales Room, 26 Exchange Place, corner of William Street, New York, on Thursday, Dec. 21st, at Twelve O'clock, Noon,

50,000 TONS OF COAL,

from the Lackawanna Regions, of the usual sizes, deliverable at Hoboken, during the month of January, 1877.

The Sale will be positive; each lot put up will be sold to the highest bidder.

No Bids, in any form whatever, being made for account of, or on behalf of the Company.

The conditions will be fully made known at the time of sale.

TERMS—FIFTY CENTS PER TON, payable in current funds, on the day of Sale, and the balance within ten days thereafter, at the Office of the Company.

SAMUEL SLOAN, President.

THE DIXON PENCIL.

OFFICE OF THE AMERICAN BANK NOTE COMPANY,
142 BROADWAY, P. O. BOX 781,
NEW YORK, July 5, 1876.

The Dixon Pencil Co.:

MY DEAR SIRS—Through our kind friend, Mr. S. J. DENNIS, I was induced to try your Dixon pencil (though very much wedded to the Faber), and from a careful trial now of several months, I am perfectly satisfied they far exceed anything I have ever used. I have taken pleasure in giving to one and another in our business, and there is but one opinion in regard to them, that of perfect satisfaction.

WM. MAIN SMILLIE,
Chief of the Art Department.

The above letter refers to the Dixon American Graphite Pencils. Send 25 cents for samples. They will more than satisfy you.

DIXON PENCIL COMPANY,
Jersey City, N. J.

Medal Awarded Centennial Exhibition, 1876.

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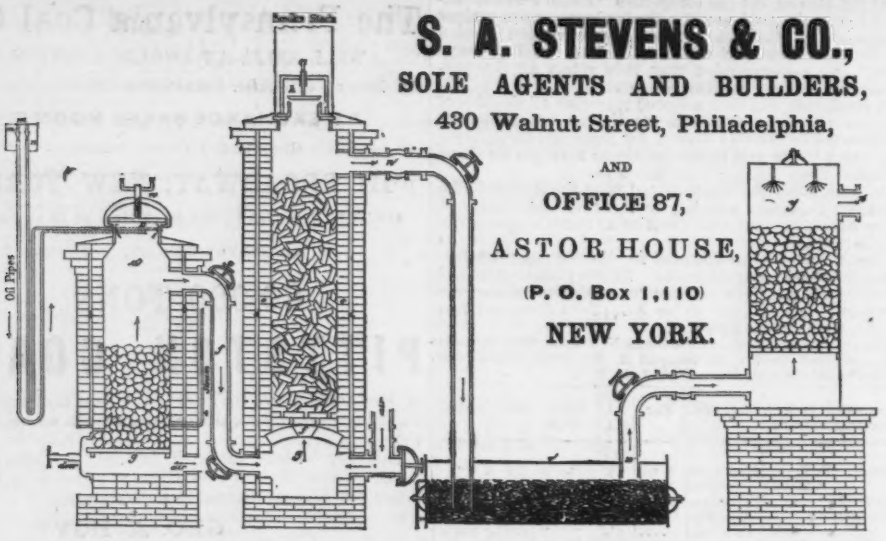

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